DOCUMENT RESUME

ED 334 739 EC 300 485

AUTHOR Wagner, Mary
TITLE The Benefits of Secondary Vocational Education for Young People with Disabilities. Findings from the National Longitudinal Transition Study of Special Education Students.
INSTITUTION SRI International, Menlo Park, Calif.
SPONS AGENCY Special Education Programs (ED/OSERS), Washington, DC.
PUB DATE Apr 91
CONTRACT 300-87-0054
NOTE 69p.; Paper presented at the Annual Meeting of the American Educational Research Association (72nd, Chicago, IL, April 3-7, 1991).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Academic Achievement; Attendance; Course Content; Curriculum; *Disabilities; Dropout Rate; *Employment; Longitudinal Studies; *Outcomes of Education; Postsecondary Education; Secondary Education; Student Characteristics; *Vocational Education
IDENTIFIERS *National Longitudinal Transition Study Spec Educ

ABSTRACT

This paper reviews the extent to which students with disabilities attending regular secondary schools were involved in vocational education, and whether students who participated in vocational education exhibited better outcomes both in school and in the first years after high school. Data from the National Longitudinal Transition Study of Special Education Students (NLTS), including a nationally representative sample of more than 8,000 students, were used. The study examined vocational course-taking by specific handicapping condition; course content; amount of vocational education; and demographic variables (grade level, gender, and ethnic background). Findings showed that students who were enrolled in occupationally oriented vocational education were significantly more likely than nonparticipants to register positive on-school and post-school outcomes. These students had significantly lower absenteeism from school and a lower probability of dropping out of school. Vocational training was related to a higher likelihood of finding a paid job and of attending a postsecondary vocational school in the early years after high school. The study also found a discrepancy between the apparent benefits of vocational education and the rates at which students with disabilities actually participated in vocational programs. Appendices contain an overview of the NLTS, supplementary statistical tables, and independent variable definitions and hypotheses supporting their inclusion in analyses. (Includes 47 references.) (JDD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

SRI International

ED334739

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

THE BENEFITS OF SECONDARY VOCATIONAL EDUCATION FOR YOUNG PEOPLE WITH DISABILITIES

FINDINGS FROM THE NATIONAL LONGITUDINAL TRANSITION STUDY OF SPECIAL EDUCATION STUDENTS

Mary Wagner, Ph. D., Director
The National Longitudinal Transition Study of Special Education Students
SRI International

Prepared for presentation to the Vocational Education Special Interest Group,
American Educational Research Association annual meetings, Chicago, Illinois, April 1991

BEST COPY AVAILABLE

This research was supported by contract number 300-87-0054 from the Office of Special Education Programs, U.S. Department of Education. The findings presented in this paper do not necessarily reflect the views or policies of the U.S. Department of Education.

EC 300485

333 Ravenswood Avenue • Menlo Park, CA 94025-3493 • (415) 326-6200 • FAX: (415) 326-5512 • Telex: 334486

THE BENEFITS ASSOCIATED WITH VOCATIONAL EDUCATION FOR SECONDARY STUDENTS WITH DISABILITIES

Increasing concern is being expressed by parents, educators, and policymakers about students who do poorly in school and those who leave school without graduating. Recent research suggests that a lack of social bonds between students and their schools may be at the heart of alienation from school and much poor school performance (Wehlage, 1983 and 1989; GAO, 1987; Pittman and Haughwout, 1987; Finn, 1989). A social bond is apparent when a student "is attached to adults and peers, committed to the norms of the school, involved in school activities, and has belief in the legitimacy and efficacy of the institution" (Wehlage et al., 1989). This theory contends that when these aspects of social bonds are missing, students will fail to attend school or, when present at school, fail to give full attention or effort to the educational process. Having done poorly in school, the chances of completing school and of making a successful transition to adult independence are diminished.

Researchers contend that the kinds of programs offered by schools can influence the extent to which students develop bonds with their schools and, therefore, students' school performance and postschool outcomes. Among the several characteristics of programs that are thought to be effective in helping students establish school bonds is the perception by students that programs are relevant to their interests and appropriate to their abilities. For many students who are not college bound, vocational education offers the potential for both relevance and appropriateness (Weber, 1987), and often is cited as one element in a strategy to prevent early school leaving (Hahn, Danzberger, and Lefkowitz, 1987).

One group for whom vocational education may be particularly relevant and appropriate is students with disabilities. These students are less likely than students as a whole to be college bound (Butler-Nalin and Wagner, 1991) and often need training in both work-related behaviors and specific job skills if they are to function effectively in the competitive job market when they leave high school.

The availability of vocational education to students with disabilities has increased markedly in recent years. The federal initiative to bring students with disabilities into the vocational education system began with the passage of the Vocational Education Act in 1963. Before that time, "handicapped students who could not compete on an equal basis with the nonhandicapped had to look outside the regular vocational education establishment for rare opportunities available to them in sheltered workshops, private training programs, or institutions for the handicapped" (Olympus Research Corp., 1974, p. 194). Amendments to the Act in 1968 further required that 10% of each state's basic federal grant for vocational education be used exclusively for programs for students with disabilities. A study of the effects of those amendments concluded that they "resulted in vocational education projects for the handicapped that would never have occurred had there been no such legislation and that most of the set-aside funds were being used to provide direct services for the handicapped" (Olympus Research Corp., 1974, p. 197).

Further legislative support for vocational education for students with disabilities occurred in the ensuing years through PL 94-142 (the Education for All Handicapped Children Act of 1975), PL 94-482 (the Education Amendments of 1976, Title II) and PL 93-112 (the Rehabilitation Act of 1973), which mandated that appropriate vocational programming for students with disabilities be provided in the least restrictive environment. At least in part through these initiatives, opportunities for vocational education for students with disabilities have continued to expand, to the point that the 1989 evaluation of the Carl D. Perkins Vocational Education Act of 1984 concluded that "handicapped...students enrolled in public high schools do have access to vocational education; in fact, they earn more credits in vocational education than other students" (Hayward and Wirt, 1989, p. viii).

We can now advance beyond questions of access to inquire whether the potential benefits of vocational training are realized by students with disabilities. Among students with disabilities, do vocational students experience better school performance than nonvocational students? Does vocational education improve the "holding power" of schools, as measured by a lower dropout rate for vocational students vs. nonvocational students? Do

students who took vocational education in high school fare better in making the transition to adult roles and responsibilities shortly after high school?

Data now available from the National Longitudinal Transition Study of Special Education Students (NLTS) permit us to address such questions for the first time. This study includes a nationally representative sample of more than 8,000 students in all 11 federal special education disability categories who were ages 13 to 21 and in special education in the 1985-86 school year. Data were collected in 1987 from telephone interviews with parents, from school records, and from a survey of educators in the schools attended by students in the sample. (Please see Appendix A for a description of data collection, data weighting, and analyses. Full reports on various aspects of sampling and data collection methods also are available; Wagner, Newman, and Shaver, 1989; Javitz and Wagner, 1990.)

This paper reviews the extent to which students with disabilities attending regular secondary schools* were involved in vocational education. The intensity of course-taking and aspects of the content of their vocational education also are described. The paper then focuses on the question of whether students who participated in vocational education exhibited better outcomes, both in school and in the first years after high school.

Vocational Course-Taking in Secondary School by Students with Disabilities

By virtue of their disabilities, many special education students are potentially at risk of poor school performance and of poor postschool outcomes. Recent research has demonstrated that students with disabilities also are disproportionately likely to experience the risk factors associated

---

* NLTS data indicate that 92% of secondary students with disabilities attended regular schools; 8% attended special schools serving only students with disabilities, although this percentage varied widely for students in different disability categories. See Appendix B, Figure B-1 for that distribution.

with economic disadvantage (Marder and Cox, 1991). In the face of these risk factors, vocational educators who serve students with disabilities provide training that has the potential to interest students, increase their skills, and prepare them for productive employment after high school. However, to experience these potential benefits of vocational education, students with disabilities must participate in vocational training. To what extent do they?

Using data from the NLTS, we can now describe several aspects of the secondary school vocational education experiences of students with disabilities Using data obtained from school records from students' most recent year in secondary school, the remainder of this section describes the extent to which students with differing disabilities who attended regular secondary schools took vocational education; the content, amount, and placement of that education; and important variations by grade level, gender, and ethnic background.

Enrollment in Vocational Education

Vocational education courses were included in the instructional programs of a majority of students with disabilities who attended regular secondary schools; 65%* of students took one or more vocational education courses during their most recent school year. This one-year rate underestimates the extent of vocational course-taking over four years in high school. The 1987 High School Transcript Study (HSTS) has shown that virtually all students with disabilities in public high schools (96%) earned some vocational credits in high school (Hayward and Wirt, 1989).

As shown in Figure 1, vocational course-taking ranged from a low of 49% of students classified as multiply handicapped to a high of more than 70% of students classified as deaf or mentally retarded. This distribution is consistent with findings from other recent research. Using data from the HSTS, Kaufman (1989) also found vocational education participation to be

---

* Percentages and means are weighted to represent students with disabilities nationally in the 1985-86 school year. Sample sizes (Ns) indicated in tables and figures are unweighted and reflect the actual number of cases on which means and percentages are based.

highest for students with mental retardation. Allen, Rawlings, and Schildroth (1989) also report a relatively high rate of vocational course-taking by deaf students (67%), based on a national sample of deaf students ages 16 to 22 in the 1986-87 school year.

Content of Vocational Education Courses

Vocational education encompasses a wide range of content areas, including home economics and prevocational or job-related skills, as well as training in specific labor market areas. This latter, occupationally oriented, vocational education was provided in the most recent school year to 86% of students who took vocational courses (Table 1). Conversely, about 14% of students who took at least one vocational course studied prevocational or home economics courses, rather than receiving occupationally specific training. Students classified as multiply handicapped not only were least

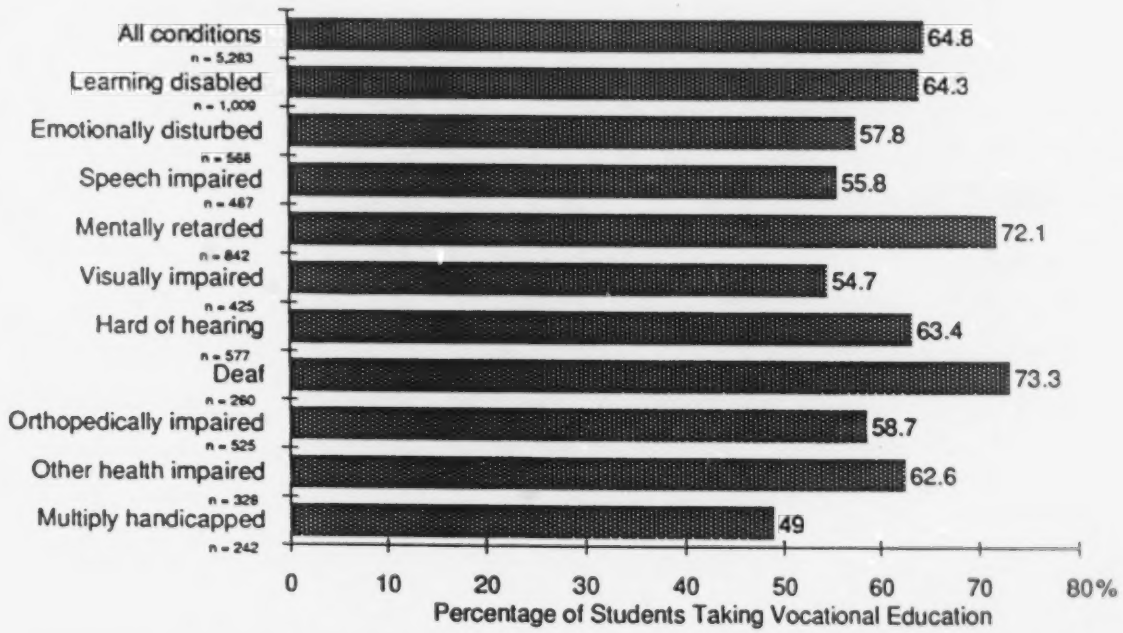

Figure 1 VOCATIONAL COURSE-TAKING OF STUDENTS ATTENDING REGULAR SECONDARY SCHOOLS

Source: Students' school records for their most recent school year.

likely to have taken vocational courses overall, but once enrolled in such courses, their courses were least likely to have involved occupationally oriented training (47%; $p<.001$).

Table 2 indicates that construction trades and office occupations were the most common occupational areas studied by vocational students with disabilities, with about 1 in 4 students being enrolled in each of those areas. Prevocational skills and machine trades were studied by 17% and 15% of vocational students with disabilities, respectively. Other occupational areas each were studied by about 10% or fewer students.

There were some significant differences in substantive area of courses by disability category. For example, students with visual impairments were significantly less likely than most other categories of students to receive training in construction trades (8% vs. 27%; $p<.001$). Students in the

---

Table 1
PERCENTAGE OF VOCATIONAL STUDENTS WITH DISABILITIES WHOSE VOCATIONAL TRAINING WAS OCCUPATIONALLY ORIENTED

Disability Category	Students Who Took Occupationally Oriented Courses Among Those Taking Any Vocational Courses		
	%	S.E.	N
All conditions	86.4	1.6	3,240
Learning disabled	85.1	2.0	667
Emotionally disturbed	79.2	3.2	331
Speech impaired	75.8	3.8	268
Mentally retarded	66.8	2.6	596
Visually impaired	75.9	5.5	201
Hard of hearing	82.4	3.7	349
Deaf	81.4	4.6	201
Orthopedically impaired	62.1	4.7	201
Other health impaired	75.7	4.5	299
Multiply handicapped	46.8	7.1	127

Source: Students' school records and/or parent reports.

Table 2
TYPE OF TRAINING RECEIVED BY SECONDARY STUDENTS WITH DISABILITIES WHO TOOK VOCATIONAL COURSES IN REGULAR SCHOOLS

Type of Vocational Training	All Conditions	Primary Disability Category: Learning Disabled	Emotionally Disturbed	Speech Impaired	Mentally Retarded	Visually Impaired	Hard of Hearing	Deaf	Orthoped-ically Impaired	Other Health Impaired	Multiply Handi-capped
Percentage of students taking vocational courses who studied:											
Construction trades	26.6	29.0	26.4	21.8	24.8	8.2	16.4	21.0	13.5	23.4	10.7
	(1.7)	(2.6)	(3.6)	(2.4)	(4.1)	(3.9)	(4.6)	(4.1)	(3.8)	(4.9)	(4.9)
Office occupations (typing/computer programming)	25.7	29.1	26.5	12.4	36.5	49.3	42.7	44.7	44.0	39.0	16.3
	(1.7)	(2.6)	(3.6)	(1.9)	(4.6)	(7.0)	(6.1)	(5.0)	(5.5)	(5.6)	(5.9)
Prevocational skills/job readiness	17.3	12.8	20.3	28.5	11.8	11.6	17.6	13.4	31.1	17.2	30.5
	(1.5)	(2.0)	(3.3)	(2.7)	(3.1)	(4.5)	(4.7)	(3.4)	(5.1)	(4.3)	(7.4)
Machine shop/auto repair	15.2	17.6	16.4	10.2	13.1	5.0	8.4	9.1	3.9	7.1	8.1
	(1.4)	(2.2)	(3.0)	(1.8)	(3.2)	(3.1)	(3.4)	(2.9)	(2.1)	(3.0)	(4.4)
Agriculture, horticulture	11.5	12.6	8.6	11.1	7.1	9.3	2.3	8.2	7.6	7.1	4.2
	(1.2)	(1.9)	(2.3)	(1.8)	(2.5)	(4.1)	(1.9)	(2.8)	(2.9)	(2.9)	(3.2)
Food service	8.0	6.4	6.0	13.8	4.7	5.5	4.7	7.2	8.2	8.0	7.5
	(1.1)	(1.4)	(1.9)	(2.0)	(2.0)	(3.2)	(2.6)	(2.6)	(3.0)	(3.1)	(4.2)
Commercial arts (design, photography, graphics)	7.4	8.7	8.0	3.0	8.2	7.2	14.9	14.0	2.6	14.4	.8
	(1.0)	(1.6)	(2.2)	(1.0)	(2.6)	(3.6)	(4.4)	(3.5)	(1.8)	(4.0)	(1.4)
Manufacturing/industrial arts	6.5	5.9	7.0	7.9	8.1	7.1	5.0	3.8	5.8	7.1	4.8
	(1.0)	(1.4)	(2.1)	(1.6)	(2.6)	(3.6)	(2.7)	(1.9)	(2.6)	(3.0)	(3.4)
Personal services (cosmetology, child care)	4.9	4.6	5.4	5.7	3.5	6.8	3.1	7.9	6.6	4.6	4.3
	(.8)	(1.2)	(1.8)	(1.4)	(1.8)	(3.6)	(2.1)	(2.7)	(2.7)	(2.4)	(3.3)
Custodial services	3.0	2.1	1.6	6.4	.2	1.8	0.0	.8	5.1	1.6	2.0
	(.7)	(.8)	(1.0)	(1.4)	(.4)	(1.9)	(.0)	(.9)	(2.4)	(1.5)	(2.2)
Other	10.1	10.5	12.4	5.5	9.0	11.8	13.7	9.1	4.9	7.6	7.7
	(1.2)	(1.8)	(2.7)	(1.3)	(2.8)	(4.5)	(4.2)	(2.9)	(2.4)	(3.0)	(4.3)
N	2,829	617	303	506	226	168	184	313	241	168	99

Source: Students' school records for their most recent year in secondary school.
Standard errors are in parentheses.

orthopedically impaired, mentally retarded, and multiply handicapped categories were more likely to receive training in prevocational skills ($p<.001$) and students in the latter two categories were less likely to be trained for office occupations ($p<.001$), for example.

The general distribution of occupational courses somewhat belies the popular notion that students with disabilities are channeled into courses that train them for low-paying service occupations, such as food or custodial services. NLTS data are consistent with findings from the HSTS that a minority of students with disabilities are trained in these areas in their vocational education courses. However, the HSTS reports that vocational students with disabilities do concentrate in service occupations more than their nondisabled peers (Hayward and Wirt, 1989).

Amount of Vocational Education

NLTS data show that students taking vocational courses averaged 4 hours of instructional time per week in those courses in their most recent school year, or about 1 course at a given time in the school year. The amount of time ranged from 3 hours per week for students with speech, health, or visual impairments, for example, to 5 hours for students who were classified as deaf or mentally retarded ($p<.01$). Occupationally oriented vocational education averaged 3 hours per week of instructional time for students taking those courses.

Regular Education Placements for Vocational Education

Not only have opportunities for vocational education increased in recent years for students with disabilities, but so has the extent to which vocational education occurs in the mainstream of regular education, along with nondisabled students. A 1974 study of the impacts of the 1968 set-aside of federal vocational education funds for students with disabilities found that 70% of the programs for such students were "special," in that students with disabilities were taught separately, rather than in regular education

classes (Olympus Research Corp., 1974). Data from both the NLTS and the HSTS suggest that 15 years later, vocational education in the mainstream is the norm for the majority of secondary special education students.

NLTS data indicate that more than three-fourths of students with disabilities (78%) who took vocational courses in their most recent school year took at least one of those courses in a regular education setting (Table 3). These rates for a single year in secondary school are similar to rates reported by the HSTS for students with disabilities over their full high school careers. HSTS data reveal that 82% of vocational credits were earned in regular education classes (U.S. Department of Education, 1990).

Table 3
STUDENTS WITH DISABILITIES IN REGULAR EDUCATION SETTINGS FOR VOCATIONAL COURSES IN THEIR MOST RECENT YEAR IN SECONDARY SCHOOL

	Vocational Education Students Mainstreamed for at Least One Vocational Course		
Disability Category	%	S.E.	N
All conditions	77.7	1.5	3,187
Learning disabled	84.8	2.0	657
Emotionally disturbed	76.9	3.3	326
Speech impaired	85.1	3.2	262
Mentally retarded	60.8	2.6	586
Visually impaired	86.2	4.4	196
Hard of hearing	80.4	3.8	345
Deaf	69.3	5.4	198
Orthopedically impaired	68.4	4.5	297
Other health impaired	73.7	4.6	195
Multiply handicapped	37.5	6.9	121

Source: Students' school records for their most recent school year.

The relatively high participation in regular education among students taking vocational courses is not surprising given that only about half of students (52%) attended schools that reported to the NLTS that they offered any vocational classes specifically for special education students, leaving regular education courses as the only option for vocational courses at students' home schools.*

The rate at which students took their vocational courses in regular education classes varied widely by disability category, from a low of 38% of students with multiple handicaps to more than twice that among students in several other categories. Not surprisingly, rates of mainstreaming generally were higher for categories of students whose functional abilities also were higher. The NLTS asked parents how well their children could perform four tasks that involved applying basic mental functions to everyday activities: counting change, telling time on a clock with hands, looking up telephone numbers and using the phone, and reading common signs. Parents rated their children's abilities on each task on a 4-point scale ranging from the ability to do the task "very well" (4 points) to "not at all well" (1 point). Scores on the 4 tasks were summed to create a scale ranging from 4 (did all 4 tasks "not at all well") to 16 (did all 4 tasks "very well"). A score of 15 or 16 on this scale is considered to indicate high functional skills. The percentages of youth with high functional ability scores were highest for youth in such categories as learning disabled, speech impaired, and hard of hearing, categories that also had among the highest rates of students taking their vocational courses in regular education settings. Conversely, functional ability scores were lowest for students classified as multiply handicapped or mentally retarded, the categories also having the lowest rates of vocational students taking those courses in regular education classes.

---

* Some students did have access to vocational courses specifically for special education students outside of their home school. The HSTS reports that 38% of the vocational education taken by students with disabilities in regular public high schools was taken outside of the home school (e.g., at area vocational centers, on-the-job, or at other educational institutions; Hayward and Wirt, 1989).

Demographic Variations in Vocational Education Experiences

The extent and nature of vocational education experiences varied, not only for students with different kinds of disabilities, but for students at different grade levels, for male and female students, and for those with different ethnic backgrounds.

Grade-level variations. Much of students' participation in vocational education occurred in the upper grades, as shown in Table 4. The NLTS found that, although only 39% of students in grades 7 or 8 took vocational courses, 67% of 9th- and 10th-graders did so. Among 11th- and 12th- graders, 82% took one or more vocational courses in their most recent year in school, a significantly higher rate of vocational course-taking than either of the other two grade-level groups. Students in upper grades who took vocational course also spent more time in them (e.g., 10 hours per week vs. 7 hours for

---

Table 4
VARIATIONS IN VOCATIONAL EDUCATION PARTICIPATION BY GRADE LEVEL

	Students' Grade Level			
Course-Taking	Grade 7 or 8	Grade 9 or 10	Grade 11 or 12	Unassigned to Grade
Percentage who took any vocational education in the most recent school year	38.8	67.0	81.8	52.4
	(4.6)	(2.4)	(1.8)	(5.4)
N	534	1,627	1,944	352
Average hours per week spent in vocational courses by students taking them	5.1	6.6	10.2	9.7
	(.4)	(.3)	(.3)	(1.0)
N	212	937	1,429	168
Percentage of vocational students who took occupationally oriented courses	89.2	88.6	87.5	73.4
	(4.5)	(2.0)	(1.8)	(7.5)
N	212	937	1,429	168
Average hours per week spent in occupationally oriented courses by students who took them	4.1	5.8	8.2	8.2
	(.4)	(.3)	(.3)	(1.0)
N	186	792	1,218	102

Source: Students' school records for the most recent school year.

9th- or 10th-graders; $p<.001$). Once students were enrolled in vocational education, however, they were about equally likely to have their vocational training be occupationally oriented, regardless of their grade level. However, again, students in upper grades who took occupationally oriented courses spent more time in them than students in earlier grades (8 hours per week vs. 6 hours for 9th and 10th graders; $p<.05$).

The fact that relatively fewer students in the lower secondary grades took vocational education is troublesome in light of the fact that more than half of students with disabilities who dropped out of school (57%) did so in 10th grade or earlier. Thus, many dropouts left school before the grades at which the large majority of students were enrolled in vocational training and could benefit from those experiences.

Students not assigned to a grade level were less likely to have taken vocational education than students at most other grade levels. Compared to students in grades 9 or 10, for example, unassigned students were significantly less likely to be enrolled in vocational education at all (52% vs. 67%; $p<.05$), and less likely for that training to be occupationally oriented (73% vs. 89%; $p<.001$). These lower levels of vocational education enrollment may relate to the generally lower abilities of students not assigned to a grade level. For example, 60% of students assigned to a particular grade level scored high on the functional mental skills scale, whereas only 16% of those not assigned to a grade level had high scores ($p<.001$). Similarly, the average IQ score for unassigned students was 52, compared to 82 for students assigned to a particular grade level ($p<.001$). However, once enrolled, students not assigned to a grade level spent as much time in vocational courses as upper-grade-level students.

There were few consistent differences by grade level in the occupational areas studied by vocational students with disabilities. Exceptions were that students not assigned to a grade level were somewhat less likely than others to be trained in office occupations (e.g., 12% of those not assigned to a grade level, compared to 28% of those in 9th or 10th grade; $p<.05$) and were

somewhat more likely to be participating in work experience programs (21% for students not assigned to a grade level, compared to 5% of those in 9th or 10th grades; $p<.05$). Students in 7th or 8th grades were significantly more likely to be enrolled in manual or industrial arts courses than students at any other grade level (e.g., 24% for students in 7th or 8th grades, compared to 6% of 9th- or 10th-graders and 4% of 11th- or 12th-graders; $p<.01$).

Gender. The gender of students is related to their participation in vocational courses, as shown in Table 5. Although males and females were about equally likely to have enrolled in some kind of vocational course in their most recent school year, males spent a significantly greater amount of time in those courses (4 hours per week vs. 3 hours; $p<.001$). Males also were significantly more likely than females to have their vocational courses be occupationally oriented (85% vs. 68%; $p<.001$).

Gender differences also were apparent in the content area of vocational courses. For example, the NLTS found that only 2% of male vocational students with disabilities took courses in personal service occupations; 13% of female students did so ($p<.001$). Similarly, female vocational students with disabilities were more than twice as likely as males to take courses in food service (14% vs. 6%; $p<.01$) and in office occupations (42% vs. 19%; $p<.001$). Conversely, male vocational students with disabilities were significantly more likely than females to be enrolled in courses in machine shop (20% vs. 3%; $p<.001$) or construction trades (35% vs. 5%; $p<.001$).

These gender differences were apparent, regardless of disability category. For example, in all categories, young men were substantially more likely to have taken machine shop or construction trades than were young women. In all categories, young women were more likely to have had training in food service occupations, and in all categories except visually impaired, they were more likely than men to have had training in office occupations, although sample sizes limit the statistical significance of these comparisons.

Table 5
VARIATIONS BY GENDER IN VOCATIONAL EDUCATION EXPERIENCES
AMONG SECONDARY STUDENTS WITH DISABILITIES

Vocational Course-taking	Gender	
	Male	Female
Percentage of students enrolled in any vocational education in their most recent secondary school year	65.3	63.9
	(1.7)	(2.5)
N	3,277	2,004
Average hours per week spent in vocational courses by students taking them	4.3	3.3
	(.2)	(.2)
N	3,216	1,984
Percentage of vocational students whose vocational classes were occupationally oriented in their most recent secondary school year	84.8	68.1
	(1.7)	(3.0)
N	2,053	1,243
Percentage of vocational students studying the following occupational areas in their most recent secondary school year:		
Agriculture	12.9	8.2
	(1.6)	(2.0)
Manufacturing/industrial arts	8.0	2.6
	(1.3)	(1.2)
Machine shop/engine repair	20.2	2.6
	(1.9)	(1.2)
Construction trades	34.9	5.0
	(2.2)	(1.6)
Commercial arts	8.8	3.9
	(1.3)	(1.4)
Office occupations	19.4	42.5
	(1.8)	(3.6)
Personal services	1.9	12.8
	(.6)	(2.4)
Food service	5.9	13.6
	(1.1)	(2.5)
Custodial services	3.3	2.4
	(.6)	(.9)
N	1,839	984

Source: Students' school records. Standard errors are in parentheses.

Similar gender differences were found in the HSTS, both for students with disabilities and for the general student population (Tuma et al., 1988). Despite the specific intent of the Carl D. Perkins Act of 1984 to support sex equity in vocational education, recent research has concluded that "over the past two decades, sex segregation in vocational enrollments has changed little. Most traditional patterns of enrollment persist" (Wirt et al., 1989).

Ethnic background. Students from all ethnic groups were about equally likely to have enrolled in vocational education. Almost two-third of white students with disabilities did so (66%), compared to 60% of black students and 57% of Hispanic students. However, white students were significantly more likely to have their vocational courses be occupationally oriented than were black students (83% vs. 74%; $p<.01$); Hispanic students did not differ significantly from other ethnic groups. No consistent pattern of differences in occupational areas was apparent between ethnic groups. However, white vocational students were significantly more likely than black students to have studied agriculture/horticulture (14% vs. 6%; $p<.05$).

From this description of vocational course-taking, we find that vocational education was a part of the educational program of most students with disabilities and that the majority of vocational students with disabilities took their vocational courses in the mainstream of regular education. However, important variations are apparent. Vocational education generally was more common for students with higher functional abilities and for students in the upper grades of secondary school. Males and white students were more likely than others taking vocational education to have that training be occupationally specific, rather than prevocational or home economics. In the following sections, we explore whether having taken vocational education is related to better outcomes, independent of other factors expected to related to those outcomes.

The Relationship Between Vocational Education and Transition Outcomes

Transition Outcomes

The NLTS has examined whether students who took vocational education in their most recent year in secondary school were more likely to have experienced positive outcomes than nonvocational students, both during secondary school and in the early postschool years. Five outcomes are examined here.

School Performance. For students in secondary school, the NLTS has assessed the relationship between taking occupationally oriented vocational education in the most recent school year* and three dimensions of students' school performance in their most recent school year:

- Engagement in the educational process, as measured by students' school attendance (number of days absent from school).** A minimum expectation for student performance is that students attend school; without participation in the educational process, its benefits are difficult to attain. However, students with some kinds of disabilities experience involuntary absenteeism due to illnesses or treatments associated with their disabilities. Others elect to skip school, perhaps because of disaffection or alienation from school. Whether voluntary or involuntary, high absenteeism has been identified as perhaps the single strongest predictor of academic failure and dropout decisions for students with disabilities (Thornton, et al., 1987; Donohoe and Zigmond, 1990; Schellenberg, Frye, and Tomsic, 1988)

---

* A dichotomous variable coded as 1 for students whose school records or whose parents indicated they had taken occupationally oriented vocational education in their most recent school year, and 0 for students who did not. See Appendix C for definitions of this and other variables in these analyses.

** Data on the number of days absent were collected on the school record abstract form. The absenteeism item was missing on 15% of forms. No significant differences were found between those for whom data were provided and those for whom it was missing on the following factors: functional ability scale scores, IQ scores, GPA, and attendance at a special school. There was however, a significantly greater absence of data for students in middle school grade levels (7 or 8) than higher grades (23% missing vs. 11% to 13% missing; $p<.01$). Because younger students had somewhat lower absenteeism, the underrepresentation of these students would slightly inflate overall absenteeism levels, particularly for disability categories that had relatively more students at those grade levels (e.g., speech impaired).

- Grade performance, as measured by whether students received one or more failing course grades.* Grades as a measure of school performance have numerous limitations, including their variation from school to school, their inflation over time, and their noncomparability for regular and special education classes. However, course grades do provide students with often-powerful messages that combine to shape students' images of themselves as learners and of their competence to perform academic tasks (Bloom, 1976; Finn, 1989). Eckstrom et al. (1986) have found that course grades more powerfully distinguish school persisters from dropouts than do general measures of achievement.

- Persistence in school, as measured by whether the student dropped out of school rather than remaining in school or persisting in school until he or she graduated or exceeded the school age limit.

Data from the NLTS suggest that many students with disabilities experienced difficulties with these several aspects of school performance (Wagner and Shaver, 1989; Wagner, 1991b and c). For example, students with disabilities attending regular secondary schools were absent from school an average of 15 days in their most recent school year; 24% of students missed more than 20 days of school. In addition, one-third of students with disabilities had failed at least one course in their most recent school year and 10% of youth who were special education students in the 1985-86 school year by 1987 were dropouts, rather than still being in school, graduating, or exceeding the school age limit. School performance

---

* NLTS data reveal that 11% of students with disabilities did not receive grades in any courses in their most recent year in secondary school. The receipt of grades was strongly related to the nature and severity of students' disabilities. For example, only 5% of students categorized as learning disabled did not receive any grades, whereas 24% of those classified as mentally retarded did not receive any grades. More than half of students with low functional mental skills did not receive grades (55%), compared with only 4% of students with high functional mental skills. Almost two-thirds of students who were not assigned to a specific grade level did not receive grades in any courses. Hence, when we analyze course grades as measures of school performance, we are "creaming" the special education student population by eliminating from the analysis students with more severe disabilities and lower functional skills.

Further, readers are cautioned that course failure rates actually may have been marginally higher than those reported here. There is reason to believe that the grades abstracted from students' records may slightly overestimate grade performance for some students. In the case of a student taking a single course for two semesters and receiving two different grades, data abstractors recruited in schools attended by students in the sample were instructed to record the grade received in the most recent semester. However, when transcripts were obtained for a subsample of students and compared to grades reported by data abstractors on the record abstract forms, 34% of the 157 cases reviewed showed discrepancies between transcript grades and record abstract grades. The majority of these cases involved abstractors reporting the higher of two grades received for two-semester courses, rather than the most recent grade. Only in cases in which the omitted grade was an F would this difference affect the statistics reported here. In addition, in a handful of cases, failed courses were not included on the record abstract form because students received no credit for them.

was a considerably greater problem for youth in some disability categories than for others. For example, among youth classified as emotionally disturbed, 46% had failed at least one course, compared to 11% of youth who were deaf ($p<.001$).

Postschool Outcomes. Regarding transition outcomes of youth who had been out of secondary school up to 2 years, the NLTS has examined whether vocational education was related to the likelihood with which youth pursued two paths after high school:

- Enrollment in a postsecondary vocational or trade school. Although the NLTS has learned that only 9% of youth with disabilities who left school in a two-year period were reported by parents to have been enrolled in postsecondary vocational or trade schools in the previous year, our interest is in learning whether that rate was higher for students who had taken occupationally specific vocational education in their last year in secondary school, compared to students who had not, independent of other differences between the students.

- Paid employment. We have focused on those who were not enrolled in postsecondary education and examined whether taking vocational education in the last year of secondary school and whether having had work experience as part of that vocational education experience were related to the likelihood that youth were reported by parents to have paying jobs at the time parents were interviewed by the NLTS. Among youth who had been out of school up to two years, 46% had a paid job at the time their parents were interviewed for the NLTS; did that rate of employment vary with differences in vocational education experiences in secondary school?

How does vocational education enrollment relate to these outcomes? A first look at the simple differences in school performance measures for students with disabilities who enrolled in occupational training, compared to those who did not, reveals virtually no differences in absenteeism, grade performance, or school persistence. Students who had been enrolled in occupationally oriented vocational education were no more or less likely to perform well in school along these measures than were other students. Substantial differences in postschool outcomes were apparent, however. For example, 13% of school leavers with disabilities who had taken occupationally oriented vocational education in their last year in secondary school had been enrolled in a postsecondary vocational school in the previous year, compared to 6% of youth who had not had that secondary vocational training ($p<.05$). Rates of employment among youth who did not go on to postsecondary school also were markedly different. More than half (51%) of youth who had taken

vocational education in their last year in secondary school were reported to be employed for pay, compared to 38% of youth who had not taken such courses ($p<.01$).

This look at simple group differences, however, does not paint a clear picture of the independent relationships between vocational education enrollment and school performance or postschool outcomes because, as was demonstrated earlier, there are important differences in the characteristics of students who did and did not take vocational education that could be expected to have an impact on their performance. For example, earlier it was shown that vocational education was most common for students with learning disabilities, a category of students also prone to poor school performance. If the confounding effects of disability differences were removed, would significant differences between vocational education enrollment and school performance emerge? Similarly, males were more likely to be enrolled in vocational education and were more likely to be employed (D'Amico, 1991). Is it the gender difference or vocational education that accounts for the higher employment rate of youth who had taken vocational education in their last year in secondary school? Multivariate analysis is required to identify the relationship of vocational education to school performance and postschool outcomes, independent of these kinds of confounding influences.

A Conceptual Framework for Understanding Transition Outcomes

In identifying the variety of factors that might impinge on vocational course-taking, school performance, or postschool outcomes, the NLTS has been guided by a conceptual framework that hypothesizes the interrelationships of many aspects of students' characteristics and their transition outcomes in both the secondary school and postsecondary stages of transition; this framework is depicted in Figure 2. It suggests that school performance (Box D) and postsecondary outcomes (Box E) are products of characteristics of students and their households and communities (Box A), other aspects of their

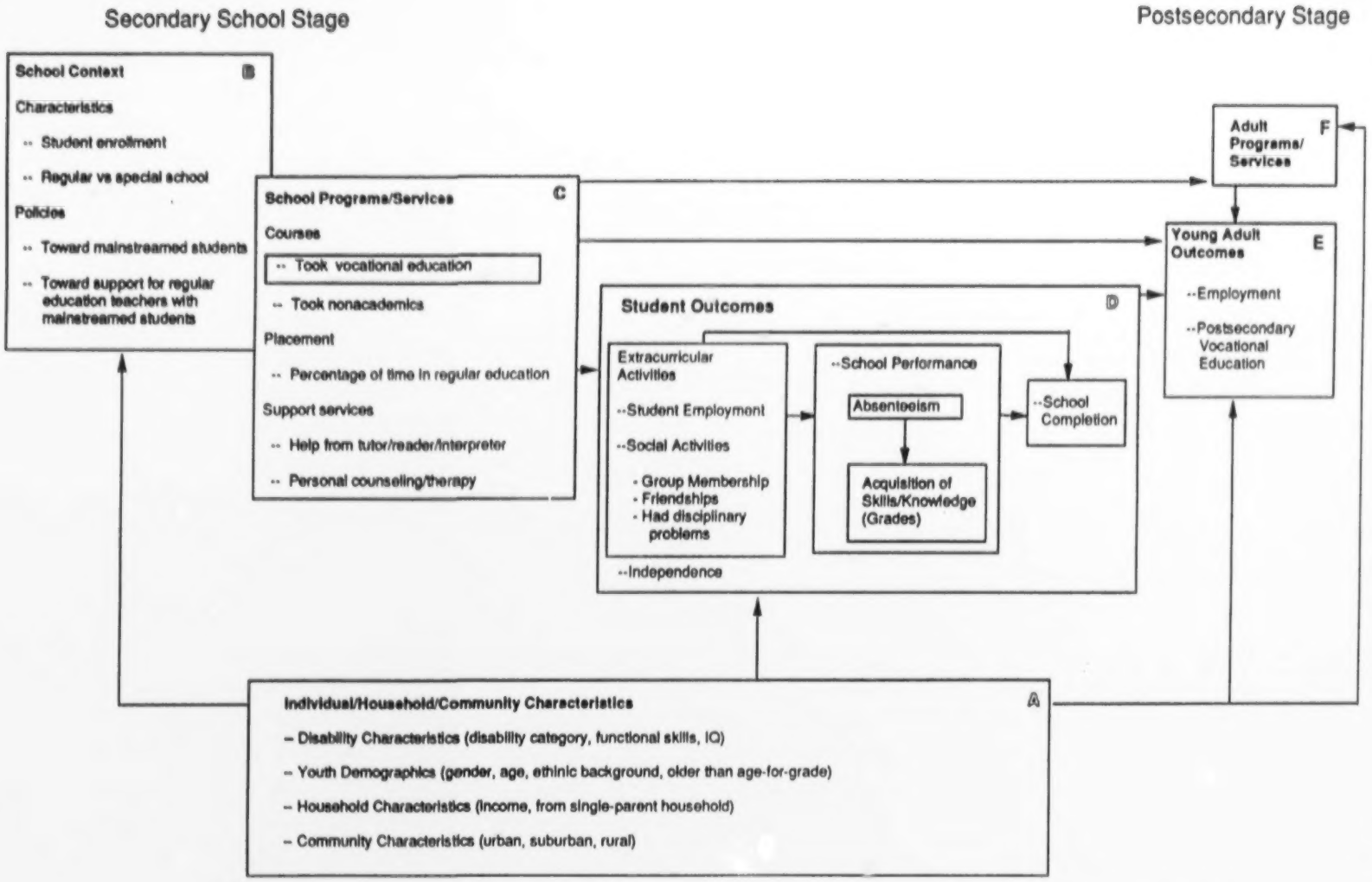

Figure 2 HYPOTHESIZED CONCEPTUAL FRAMEWORK OF INFLUENCES ON TRANSITION OUTCOMES OF YOUTH WITH DISABILITIES

behavior and activities (within Box D), and students' schools and school programs (Boxes B and C), including enrollment in vocational education. It also suggests that many of these same factors (Boxes A and B) influence students' school programs, including vocational education course-taking.

To identify the independent relationship of vocational education enrollment to school performance and postsecondary outcomes, these other categories of influences must be controlled for in multivariate analyses. Appendix C specifies the variables included in the NLTS multivariate analyses of school performance and transition outcomes and the hypotheses underlying their choice.

Vocational Education and School Performance

Three multivariate analyses related to vocational education and school performance were performed. To identify the relationship between vocational education and student absenteeism, controlling for the factors specified in Figure 2 and in Appendix C, an ordinary least squares regression was performed with the number of days absent from school as the dependent variable. Because the other two measures of school performance are dichotomous rather than continuous, logit analyses were employed to analyze whether students had failed a course and whether students had dropped out rather than persisting in school.

Each of these analyses included a dichotomous independent variable measuring whether students had been enrolled in occupationally oriented vocational education in their most recent school year. In line with the social bonding theory discussed earlier, we hypothesized that students who had been enrolled in vocational education would be more likely than nonvocational students to attend school more regularly, thereby having fewer days absent, and would be less likely to fail courses or to drop out of school.

Table 6 presents the results of multivariate analyses identifying the relationships between having taken occupationally oriented vocational education in the most recent school year and school performance in that year, controlling for multiple individual, household, and school factors.* All statistically significant relationships are reported. Because interpretation of logit coefficients is not straightforward, they have been converted in Table 6 into the percentage point change in the estimated probability of failing a course or dropping out, given the specified value of the variable, with all other variables in the analysis at their mean values for students attending regular secondary schools.

We see a consistent pattern of relationships between enrollment in occupationally oriented vocational education and better school performance. Students who had occupational training were absent from school significantly fewer days (1.5 days; $p<.05$) than students who did not have such training, other factors being equal. Similarly, students taking occupationally oriented vocational education were significantly less likely to drop out of school ($p<.01$), when other factors were controlled. The NLTS estimates that the likelihood of dropping out rather than persisting in school was 3 percentage points lower for vocational students than for others. The analysis also indicates that vocational students were about 3 percentage points less likely than others to have failed a course, although this difference did not attain statistical significance.

Examining the relationships between taking vocational education and the separate measures of school performance actually underestimates the total magnitude of the relationships, because the measures of school performance

---

* Actual logit coefficients are included in Appendix B, Table B-1. Appendix B also indicates the unweighted means for the full sample of students in secondary school and for the subsample in each multivariate model. Because the models included a variable indicating whether the student was older than the typical age-for-grade-level, only students assigned to a grade level were included in the multivariate analyses; those assigned to a grade level were more than 90% of students attending regular schools. The elimination of unassigned students accounts for a difference in means between the full sample and analysis samples in variables associated with severity of disability, including the percentage having taken vocational education. Correlations presented in Table B-3 did not differ significantly, however, suggesting that the relationship between vocational education and the dependent measures were not affected by the differences in levels of course-taking. Conservatively, however, the findings reported here should be interpreted as applying to students with disabilities who were assigned to a grade level.

Table 6

ESTIMATED CHANGE IN SCHOOL PERFORMANCE ASSOCIATED WITH DISABILITY, INDIVIDUAL, HOUSEHOLD, COMMUNITY, AND BEHAVIORAL CHARACTERISTICS OF STUDENTS WITH DISABILITIES

	Estimated Change in:			
Independent Variables	Average Number of Days Absent	Rate of Course Failure (Percentage Points)	Rate of Dropping Out (Percentage Points)	For Increment
Student took occupationally oriented vocational education in the most recent school year	-1.5*	-3.3	-2.7*	Yes vs. no
Disability Characteristics				
Youth classified as:				
Emotionally disturbed	-1.5	6.4	2.2	Emotionally disturbed vs. learning disabled
Speech impaired	-4.9***	.4	-1.1	Speech impaired vs. learning disabled
Mildly/moderately mentally retarded	-1.4	-7.0	-2.0	Mentally retarded vs. learning disabled
Deaf	-5.4***	-15.4***	-2.3	Deaf vs. learning disabled
Hard of hearing	-4.6***	-8.6	-4.9	Hard of hearing vs. learning disabled
Visually impaired	-3.3**	-13.8**	.0	Visually impaired vs. learning disabled
Orthopedically impaired	-2.0	-12.0*	-4.3	Orthopedically impaired vs. learning disabled
Other health impaired	1.4	-14.9**	-3.0	Health impaired vs. learning disabled
Severely impaired (SMR, multiply handicapped)	-2.8*	-18.7**	-5.5*	Severely impaired vs. learning disabled
Functional ability scale score	1.1*	2.1	-1.1	High (16) vs. medium (12)
Self-care ability scale score	-2.5***	4.8	.8	High (11) vs. medium (8)
Demographic Characteristics				
Age in most recent school year	.7	-8.7**	2.2	19 vs. 15
Youth was male	-.7	8.9***	-1.9	Yes vs. no
Youth was minority	.5	6.6*	-2.8*	Yes vs. no
Household income (5 category scale)	-2.0***	-5.0*	-.2	$38,000 to $50,000 vs. <$12,000
From single-parent household	2.2***	-1.2	1.2	Yes vs. no
Student attended school in urban area	2.1**	2.0	-.4	Urban vs. suburban
Student Behaviors				
Student absenteeism	NA	9.0***	1.7***	18 days vs. 8 days
Student failed one or more courses	NA	NA	6.9***	Yes vs. no
Has had disciplinary problems	8.7***	9.3*	14.9***	Yes vs. no
Student belonged to school/community group	-2.6***	-6.9**	-4.0**	Yes vs. no
Frequency of seeing friends (6 category scale)	.6**	6.8**	-1.3	4 or 5 days/week vs. once/week
School Characteristics/Programs				
Student enrollment	-.5	1.9*	-.5	1300 students vs. 700
School provided in-service training on mainstreaming to regular education teachers with mainstreamed students	-.3	1.1*	.9	Yes vs. no
Student received from the school in the past year:				
Personal counseling/therapy	2.2***	2.6	-3.3**	Yes vs. no
Help from a tutor/reader/interpreter	-.6	-.2	-3.4*	Yes vs. no
% of time in regular education classes	-.3	8.2***	.4	6 classes vs. 3 classes
Number of graded courses	NA	8.2***	NA	6 classes vs. 4 classes

*=p<.05; **=p<.01; ***=p<.001

Only statistically significant relationships are reported here. See Table B-1, Appendix B for a listing of all variables included in the analyses and their coefficients.

are themselves related, as indicated in the conceptual framework in Figure 2. Absenteeism has a direct relationship to failing course grades and, together, absenteeism and course failure are directly related to dropping out. The total relationship of vocational education to course failure, then, includes both its direct relationship and its indirect relationship through lowered absenteeism. Similarly, taking vocational education is directly related to a reduced likelihood of dropping out, and is indirectly related through both lowered absenteeism and a lowered probability of course failure.

To illustrate, let us consider a group of students with characteristics that may put them at risk of poor school performance. Male, 17-year-old students with learning disabilities from low-income households in urban areas might be such students. Let us assume that each had the average IQ and functional skill levels of youth in their disability category and, as the majority of such students, each was a year older than their peers because they repeated an earlier grade. The analysis of absenteeism would suggest that if such students had taken occupationally oriented vocational education in their most recent school year, they would average 16 days absent from school, compared to 17.5 days for similar students who had not had vocational education. With a lower level of absenteeism and enrollment in vocational education, we would estimate the first group of students would have a 50% probability of failing a course, compared to 56% for students who had not had vocational education, with the associated higher absenteeism.

The magnitude of relationship is further compounded when considering the probability of dropping out, rather than persisting in school. Given their lower absenteeism and lower probability of course failure, the vocational education students are estimated to have an 8% chance of dropping out, rather than persisting. Their fellow students who had not taken vocational education, and had the associated higher absenteeism and higher probability of course failure, would be estimated to have a 15% likelihood of dropping out, or almost twice the probability of early school leaving. Hence, vocational education appears to offer the potential for a significant benefit to students with disabilities in terms of their school performance and school completion.

Secondary Vocational Education and Postschool Outcomes

To examine the relationships between secondary vocational education and both postsecondary vocational school enrollment and paid employment, logit analyses were performed guided by the conceptual framework presented earlier. Analyses included youth who were at least 16 years old, non-institutionalized, and who had been out of secondary school up to two years. For the first analysis, a dichotomous dependent variable indicated whether the youth was reported by parents to have attended a postsecondary vocational or trade school in the previous year. The second analysis, which included only youth who had not gone to postsecondary schools in the previous year, included a dichotomous dependent variable indicating whether the parent reported the youth had a paid competitive job at the time of the 1987 interview.

The analysis of postsecondary vocational school enrollment included a dichotomous independent variable indicating whether the youth had been enrolled in occupationally oriented vocational education is the last year in secondary school. In the analysis of employment, a somewhat more detailed look was taken at vocational education relationships by including in the analysis both a dichotomous independent variable indicating whether the youth had taken vocational education in the last year in secondary school, and a second variable indicating whether that vocational education had involved work experience as part of the program. Other independent variables in the analyses included the individual, household, community, and school characteristics discussed earlier.

Table 7 lists the independent variables that were found to have statistically significant relationships to postsecondary vocational school enrollment or whether youth had a paid job.* In both analyses, having taken vocational education in the last year in secondary school was significantly related to positive postschool outcomes.

---

* Table B-4 in Appendix B lists the logit coefficients for all the independent variables included in these analyses. Tables B-5 and B-6 present the unweighted means and correlations for the full samples of youth specified for the models and the subsamples that had data on all variables needed to include them in the multivariate analyses.

Table 7

ESTIMATED CHANGE IN POSTSCHOOL OUTCOMES OF YOUTH WITH DISABILITIES IN THE FIRST TWO YEARS AFTER SECONDARY SCHOOL

Independent Variables	Estimated Change in: Attendance Rate at Postsecondary Vocational School (Percentage Points)	Estimated Change in: Rate of Competitive Employment (Percentage Points)	For Increment
Student took vocational education in the most recent year	7.7**	9.3*	Yes vs. no
Youth had work experience as part of secondary vocational education	NA	13.9**	Yes vs. no
Disability Characteristics			
Youth classified as:			
Emotionally disturbed	-6.6	-11.0	Emotionally disturbed vs. learning disabled
Speech impaired	-7.3	-1.8	Speech impaired vs. learning disabled
Mildly/moderately mentally retarded	-7.3	-15.0*	Mentally retarded vs. learning disabled
Deaf	-10.4	-27.4***	Deaf vs. learning disabled
Hard of hearing	-7.5	-10.2	Hard of hearing vs. learning disabled
Visually impaired	-4.9	-27.5***	Visually impaired vs. learning disabled
Orthopedically impaired	-11.5	-46.3***	Orthopedically impaired vs. learning disabled
Other health impaired	-7.3	-16.7*	Health impaired vs. learning disabled
Severely impaired (SMR, multiply handicapped)	-12.2	-8.3	Severely impaired vs. learning disabled
Functional ability scale score	2.6	-10.5**	High (16) vs. medium (12)
Self-care ability scale score	-.2	-33.0***	High (12) vs. medium (8)
Demographic Characteristics			
Age	-1.9	-8.3*	19 vs. 15
Youth was male	3.2	12.8***	Yes vs. no
Youth lived in urban area	2.0	-10.1*	Urban vs. suburban
Unemployment rate in local area	NA	-6.4*	10% vs. 5%
Students' School Programs			
Youth was high school graduate	3.6	16.6***	Graduated vs. dropped out
Youth out of high school 1 to 2 years	-5.8**	5.0	Out of school 1-2 years, vs. <1 year

*=p<.05; **=p<.01; ***=p<.001

Only statistically significant relationships are reported here. See Table B-4, Appendix B for a listing of all variables included in the analyses and their coefficients.

Among youth who had been out of high school up to 2 years, those who had taken vocational education in secondary school were estimated to be 8 percentage points more likely to have attended a postsecondary vocational school in the previous year than were nonvocational students, controlling for other factors in the analysis. (Similar analyses regarding enrollment at 2-year or 4-year colleges revealed no significant relationship between secondary school vocational education and postsecondary college enrollment.)

Regarding employment, students who had taken vocational education in their last year in secondary school were 9 percentage points more likely to be competitively employed than youth who had not taken vocational education, other factors being equal. If youths' secondary vocational education involved work experience, an even greater likelihood of employment resulted (14 percentage points), beyond the increased probability associated with vocational educational enrollment alone, other factors having mean values for students who had attended regular secondary schools.

As with the analysis of school performance, the separate relationships of vocational education experiences to these outcomes underestimates the magnitude of the total relationship. As the school performance analysis documented, vocational students had a lower probability of dropping out than nonvocational students, other factors being equal. If the amount of the lower likelihood of dropping out that is attributable to vocational education enrollment is incorporated in the analysis of postschool outcomes, both the direct and indirect effects of vocational education can be estimated. This point can be illustrated by returning to the previous example of male learning disabled students with characteristics that would put them at risk of poor school performance and poor transition outcomes. NLTS findings suggest that, among these students, youth who had taken vocational education in their most recent school year, and who had the associated higher likelihood of graduating from high school, would have an estimated probability of finding paid employment shortly after high school of 78%. This compares to only a 55% probability for similar students who had not had vocational education or work experience in their most recent year in high school and who had the associated lower probability of graduating from high school.

Discussion

The findings presented here and in other NLTS analyses (Wagner et al., 1991) support the notion depicted in the conceptual framework in Figure 2 that transition is a multiyear process that begins in secondary school. Students' experiences in secondary school can and do help to shape their experiences and accomplishments after leaving school.

School performance has a powerful relationship to school completion. Among students with disabilities, those who missed more school and those who failed a course in their most recent year in school were more than half again as likely to drop out as students who had better attendance and were passing all their courses. This suggests that if schools can give students powerful reasons to come to school and can help students achieve in their courses, they can help students persist in school. Further, we have shown a strong link between school completion and later transition outcomes. Students who graduated from high school were on an upward trajectory into their early adult lives relative to students who dropped out.

These findings should be heartening to educators who serve students with disabilities. They have the ability to influence the transition outcomes of their students by performing effectively their primary educational mission. If they can engage their students in school and help their students to perform up to their ability and to school expectations, they will have gone far toward ameliorating the propensity toward early school leaving. If successful in helping students to complete school, they will have gone far in setting those students on a positive road into adulthood.

NLTS findings suggest that secondary school vocational education is one educational intervention that appears to hold potential for positive school performance as well as positive postschool outcomes. Across several of the in-school and postschool outcomes we have examined, students who were enrolled in occupationally oriented vocational education were significantly more likely than nonparticipants to register positive outcomes, independent of characteristics of the students who were enrolled. Students who took

occupationally oriented vocational courses had significantly lower absenteeism from school and a significantly lower probability of dropping out of school, when demographic and disability differences between students were controlled. Independent of its effects on students' decisions to dropout, having had vocational training was significantly related to a higher likelihood of finding a paid job and of attending a postsecondary vocational school in the early years after high school.

The explanation for the apparent beneficial effects of vocational education is less clear than its relationship to various outcomes. School bonding theory would suggest that perhaps occupational vocational training was perceived as more relevant than academic programs to the interests of students with disabilities, the large majority of whom did not go on to college; from this perspective, establishing the relevance of educational programs is seen as a key factor in engaging students actively in their education. Perhaps different standards for student performance in occupationally oriented vocational classes enabled students to feel they could succeed and to persist in school. Perhaps occupational vocational students acquired better work skills and behaviors through their training that enabled them to compete more effectively in the labor market.

Whatever the combination of explanations, a consistent pattern of positive outcomes has emerged in relation to occupationally oriented vocational training for students with disabilities. Yet, only about 56% of students had such training in their most recent school year. Occupationally specific vocational education was not common for students until they reached the upper grades; for example, only 35% of 7th- or 8th-graders took such courses, compared to 59% of those in 9th or 10th grades and 72% of those in 11th or 12th grades. Those not assigned to a grade level were least likely to have taken occupational training (38%). Young women were also significantly less likely than men to have had training in job skills for a particular type of occupation (44% vs. 55%).

The discrepancy between the apparent benefits of vocational education for students with disabilities and the rates at which students actually participated in vocational programs in their most recent school year should raise questions regarding potential obstacles to vocational course-taking. One potential obstacle of particular concern is the increased academic credit requirements for graduation that have been implemented in many states. As credit requirements in mathematics, science, or foreign language increase, for example, the space in students' schedules for courses in vocational education is reduced. In such situations, students with disabilities may face the tough dilemma of wanting to graduate (but perhaps struggling in many of the academic courses required) vs. choosing vocational courses that may match students' interests and abilities (but giving up the possibility of earning a regular diploma at graduation). Education reform efforts spawning increased graduation requirements largely have failed to consider their effects on students with disabilities or others who already struggle to hold their own academically.

At the same time that we should be concerned that students do not face serious disincentives to vocational education enrollment, we also must recognize that, despite its apparent benefits, it is not the "answer" for all students with disabilities. One might be tempted to conclude, from the findings presented here, that students with disabilities should be actively encouraged to take part in the vocational education available to them. However, a note of caution is in order before we embrace this conclusion.

Although occupationally oriented vocational courses are related to positive outcomes for students with disabilities as a whole, we must recognize the tremendous variation in the abilities and experiences of students with disabilities. Recent research has demonstrated powerfully that students with differing disabilities vary as much one from another as they do from students without disabilities. Even within a single disability category, young people represent a broad range of functional skills, interests, and potential for positive transition outcomes (Marder and Cox, 1991). Enrolling many students with disabilities in occupational courses may well help them in school and beyond. For others, however, such tracking may

limit opportunities to take academic courses that could enable them to pursue a college education or further postsecondary training. Occupationally oriented vocational training should be an option available to secondary students with disabilities; a decision as to whether a given student participates in such training must reflect the interests, aspirations, and abilities of that student.

REFERENCES

Allen, T.E., Rawlings, B. W., and Schildroth, A.N. (1989). Deaf students and the school-to-work transition. Baltimore: Paul H. Brookes Publishing Co.

Alpert, G., and Dunham, R. (1986). Keeping academically marginal youth in school. Youth and Society, 17, 346-361.

Bachman, J. G., Green, S. and Wirtanen, I.D. (1971). Youth in transition, vol. III: Dropping out--problem or symptom? Ann Arbor, MI: Institute for Social Research.

Bloom, B.S. (1976). Human characteristics and school learning New York: McGraw-Hill.

Butler-Nalin, P. and Wagner, M. (1991). Enrollment in postsecondary schools. In Wagner et al. (1990), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

D'Amico, R. (1990). The working world awaits: Employment experiences during and shortly after high school. In Wagner et al. (1990), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

Donahoe, K. and Zigmond, N. (1990). Academic grades of ninth-grade urban learning-disabled students and low achieving peers. Exceptionality, 1, 17-28.

Eckstrom, R. et al. (1986). Who drops out of high school and why? Findings from a national study. In Natriello, G. (ed.), School dropouts: patterns and policies. New York: Teachers College Press.

Finn, J.D. (1989). Withdrawing from school. Review of Educational Research, 59: 117-142.

Grabe, M. (1981). School size and the importance of school activities. Adolescence, 61, 21-31.

Greenberger, E. and Steinberg, L. (1983). Sex differences in early labor market experiences: Harbinger of things to come. Social Forces 62: 467-486.

Gump, P. (1978). Big schools, small schools. In R.G. Baker (ed.), Habitats, environments, and human behavior. San Francisco: Jossey-Bass.

Hahn, A., Danzberger, J., and Lefkowitz, B. (1987). Dropouts in American: Enough is known for action. Washington, DC: Institute for Educational Leadership.

Hayward, B. and Wirt, J. (1989). Handicapped and disadvantaged students: Access to quality vocational education. Washington, D.C.: U.S. Department of Education, National Assessment of Vocational Education.

Javitz, H. and Wagner, M. (1990). National Longitudinal Transition Study of Special Education Students: Report on sample design and limitations, wave 1 (1987). Menlo Park, CA: SRI International.

Jay, E.D. (1991). A broader look at outcomes: Engagement in productive activities after high school. In Wagner, et al. (1990), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

Jay E.D. and Padilla, C.L. (1987). Special education dropouts: The incidence and reasons for dropping out of special education in California. Menlo Park, CA: SRI International.

Kaufman, P. (1989). Participation of special education students in vocational education: The relative influence of student background and school characteristics. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Mahan, G., and Johnson, C (1983). Portrait of a dropout: Dealing with academic, social, and emotional problems. NASSP Bulletin, 67, 80-83.

Marder, C., and Cox, R. (1991). More than a label: Characteristics of youth with disabilities. In Wagner et al. (1990), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

Newman, L.A. (1991). Social activities. In Wagner et al. (1991), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

Olympus Research Corp. (1974). An assessment of vocational education programs for the handicapped under Part B of the 1968 Amendments to the Vocational Education Act. Salt Lake City, UT: Olympus Research Corp.

Pallas, A.M., Natriello, G., and McDill, E.L. (1988). Who falls behind: Defining the "at risk" population--Current dimensions and future trends. Paper presented at the annual meeting of the American Educational Research Association. New York, NY: Teachers College, Columbia University.

Peng, S.S. and Takai, R.T. (1987) High school dropouts: Descriptive information from High School and Beyond. Washington, D.C.: National Center for Education Statistics.

Pittman, R.B., and Haughwout, P. (1987). Influence of high school size on dropout rate. Educational Evaluation and Policy Analysis, 9(4), 337-343.

Rumberger, R.W. (1987). High school dropouts: A review of issues and evidence. Review of Educational Research, 57 (2), 101-121.

Schellenberg, S.J., Frye, D.W.M. and Tomsic, M.L. (1988). Loss of credit and its impact on high school students: A longitudinal study. Paper presented at the annual meeting of the American Educational Research Association. St. Paul, MN: St. Paul Public Schools.

Scott-Jones, D. (1984). Family influences on cognitive development and school achievement. Review of Research in Education, 11, 259-304.

Thornton, H., Liu, M., Morrow, D., and Zigmond, N. (1987). Early identification of LD students at risk for becoming school dropouts. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.

Thornton, H. and Zigmond, N. (1987). Predictors of dropout and unemployment among LD high school youth: The holding power of secondary vocational education for LD students. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.

Tuma, John, et al. (1988). Enrollment trends in vocational and academic education in American public high schools 1069 to 1987. Berkeley, CA: MPR Associates.

U.S. Bureau of the Census (1987). School enrollment--social and economic characteristics of students: October 1983. Washington, D.C.: U.S. Government Printing Office.

U. S. Department of Education (1990). "To Assure the Free Appropriate Public Education of All Handicapped Children": Twelfth Annual Report to Congress on the Implementation of the Education of the Handicapped Act. Washington, DC: U.S. Department of Education.

U.S. General Accounting Office (1986). School dropouts: The extent and nature of the problem. Briefing Report to Congressional Requesters. Washington, DC.

U.S. General Accounting Office (1987). School dropouts: Survey of local programs. Briefing Report to Congressional Requesters. Washington, DC.

Vito, R.C. and Connel, J.P. (1988). A longitudinal study of at-risk high school students: A theory-based description and intervention. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Wagner, M. (1990a). Reflections. In Wagner et al. (1991), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

b. Secondary school completion. In Wagner et al. (1991), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

c. Secondary school performance. In Wagner et al. (1991), Young people with disabilities: How are they doing? The first comprehensive report from the National Longitudinal Transition Study of Special Education Students. Menlo Park, CA: SRI International.

Wagner, M.M., Newman, L. and Shaver, D. (1989). The National Longitudinal Transition Study of Special Education Students: Report on Procedures for the First Wave of Data Collection (1987). Menlo Park, CA: SRI International.

Wagner, M.M. and Shaver, D.M. (1989). Educational programs and achievements of secondary special education students: Findings from the National Transition Study. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Wehlage, G.G., et al. (1989). Reducing the risk: Schools as communities of support. Philadelphia: Falmer Press.

Wehlage, G.G. (1983). Effective programs for the marginal high school student. Bloomington, IN: Phi Delta Kappa Educational Foundation.

Wehlage, G.G., and Rutter, R. (1986). Dropping out: How much do schools contribute to the problem? Teachers College Record, 87, 374-392.

William T. Grant Foundation Commission on Work, Family and Citizenship (1988). The forgotten half: Non-college youth in American. Washington, D.C.

Wirt, J.G., Muraskin, L.D., Goodwin, D.A., and Meyer, R.H. (1989). Summary of findings and recommendations. Washington, DC: U.S. Department of Education, National Assessment of Vocational Education.

Zigmond, N. (1987). Convergent studies of LD students at risk for dropping out of high school: An overview. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C..

APPENDIX A

OVERVIEW OF THE NATIONAL LONGITUDINAL TRANSITION STUDY OF SPECIAL EDUCATION STUDENTS

As part of the 1983 amendments to the Education of All Handicapped Children Act (EHA), the Congress requested that the U.S. Department of Education conduct a national longitudinal study of the transition of secondary special education students to determine how they fare in terms of education, employment and independent living. A 5-year study was mandated, which was to include youth from ages 13 to 21 who were in special education at the time they were selected and who represented all 11 federal disability categories.

In 1984, the Office of Special Education Programs (OSEP) of the U.S. Department of Education contracted with SRI International to determine a design, develop and field test data collection instruments, and select a study sample. In April 1987, under a separate contract, SRI began the National Longitudinal Transition Study of Special Education Students (NLTS).

In the field of research on youth with disabilities, the NLTS is unique in several respects. For many years, the research base on youth with disabilities has consisted largely of studies of relatively few youth who were in particular disability categories, in a few school districts or a single state, or in a specific educational placement or treatment program. It has been very difficult to paint a broad picture of students from this fragmented research base. With the NLTS, findings are based on a sample that is large and nationally representative. The data presented here were collected in 1987 for a sample of more than 8,000 youth who represent the national population of secondary special education students who were ages 13 to 21 in the 1985-86 school year. The sample permits us to estimate with fairly high precision many of the characteristics of youth with disabilities and their experiences in adolescence and early adulthood. Further, the sample is nationally representative of 1985-86 secondary special education students both as a whole and for those in each of the 11 federal disability categories separately. Therefore, for the first time we know what the transition experiences were for youth with mental retardation, for example, and how they differed from those of youth with orthopedic impairments or multiple handicaps.

The NLTS is also unusual in its longitudinal design. The students for whom data were gathered in 1987 are being retained in the study so that follow-up data can be collected about them in 1990. These follow-up data will enable the estimation of trends in experiences as youth age. For example, we will be able to describe the movement in and out of jobs and in and out of school that often characterizes youth in their early adult years.

Finally, the NLTS is extremely broad in scope, gathering information on a wide range of characteristics, experiences, and outcomes of youth with disabilities, including the following:

- *Individual and family characteristics* (e.g., demographics, disability-related characteristics).
- *Independent functioning* (e.g., residential independence, financial independence, functional abilities).
- *Social experiences* (e.g., belonging to school or community groups, socializing with friends).
- *School programs* (e.g., courses taken, support services provided, educational placements).
- *School characteristics and policies* (e.g., type of school attended, policies related to mainstreaming, programs available for special education students).
- *School achievement and completion* (e.g., grades received, absenteeism, dropout/graduation behaviors).
- *Employment characteristics* (e.g., rates of employment, job types and duration, wages).
- *Postsecondary education participation in vocational schools and 2-year and 4-year colleges.*
- *Services provided by the school and other sources* (e.g., job training, physical therapy, counseling).
- *Parental expectations for youth in the areas of education, employment, and independence.*

This breadth of scope provides the most comprehensive picture yet available of youth with disabilities during adolescence and early adulthood.

Study Components

The NLTS has four major components:

- *The Parent/Guardian Survey*. In the summer and fall of 1987, parents were interviewed by telephone to determine information on family background and expectations for the youth in the sample, characteristics of the youth, experiences with special services, the youths' educational attainments (including postsecondary education), employment experiences, and measures of social integration. Parents rather than youth were selected as respondents for the first wave of data collection because of the need for family background information and because, with most students still being in secondary school and living at home, parents were believed to be accurate respondents for the issues addressed. A survey will be conducted in the fall of 1990, when youth will be interviewed if they are able to respond.
- *School Record Abstracts*. Information has been abstracted from students' school records for their most recent year in secondary school (the 1985-86 or 1986-87 school year). This information

relates to courses taken, grades achieved (if in a graded program), placement, related services received from the school, status at the end of the year, attendance, IQ, and experiences with minimum competency testing. In the second wave of data collection in 1990, secondary school transcripts will be sought for all youth who were in secondary school at any time since the 1986-87 school year.

- *School Program Survey*. Schools attended by sample students in the 1986-87 school year were surveyed for information on enrollment, staffing, programs and related services offered to secondary special education students, policies affecting special education programs and students, and community resources for the disabled. A similar survey will be conducted in 1991 for youth still in secondary school in the 1990-91 school year.

- *Explanatory Substudies*. Studies involving two subsamples of youth have looked in greater depth at 1) students' secondary school programs (the school program substudy), 2) the patterns of transition outcomes achieved by youth who were out of secondary school (the exiter substudy), and the relationship between school experiences and outcomes. Substudies were conducted in 1989 and 1990

The NLTS Sample

The NLTS sample was constructed in two stages. A sample of 450 school districts was randomly selected from the universe of approximately 14,000 school districts serving secondary (grade 7 or above) special education students,* which had been stratified by region of the country, a measure of district wealth involving the proportion of students in poverty (Orshansky percentile), and student enrollment. Because not enough districts agreed to participate, a replacement sample of 178 additional districts was selected. More than 80 state-supported special schools serving secondary-age deaf, blind, and deaf-blind students were also invited to participate in the study. A total of 303 school districts and 22 special schools agreed to have their students selected for the study.

Analysis of the potential bias of the district sample indicated no systematic bias that would have an impact on study results when participating districts were compared to nonparticipants on several characteristics of the students served, participation in Vocational Rehabilitation programs, the extent of school-based and community resources for the disabled, the configuration of other education agencies serving district students, and metropolitan status (see Javitz, 1990 for more information on the LEA sample). Bias may exist, of course, on factors for which data were not available for such comparisons.

---

* The 1983 Quality Education Data, Inc. (QED) database was used to construct the sampling frame. QED is a private nonprofit firm located in Denver, Colorado. Special education cooperatives and other special service units were not sampled directly (83% of special education students are served directly by school districts; Moore et al., 1988). However, instructions to districts for compiling student rosters asked districts to include on their listing any students sent from their district to such cooperatives or special service units. Despite these instructions, some districts may have underreported students served outside the district.

Students were selected from rosters compiled by districts, which were instructed to include all special education students in the 1985-86 school year who were in grades 7 through 12 or whose birthdays were in 1972 or before, whether or not they were served within the district or outside the district (e.g., in a state-supported residential school). Rosters were stratified into 3 age groups (13 to 15, 16 to 18, over 18) for each of the 11 federal disability categories and youth were randomly selected from each age/disability group so that approximately 800 to 1,000 students were selected in each disability category (with the exception of deaf-blind, for which fewer than 100 students were served in the districts and schools included in the sample).

In part because of the time lapse between sample selection and data collection, many students could not be located at the addresses or telephone numbers provided by the schools. Of the 12,833 students selected for the sample, about one-third could not be reached by telephone for the parent interview. (For more than half of these, addresses and telephone numbers were not provided by the schools/districts from which they were sampled.) This relatively high rate of inability to reach sample members confirmed the importance of including in the NLTS a substudy of nonrespondents to determine whether those who were reached for the telephone interview were a representative sample of the population to which the study was intended to generalize. To identify whether bias existed in the interview sample, interviewers went to 28 school districts with relatively high nonresponse rates to locate and interview in person those who could not be reached by telephone. Of the 554 sought for in-person interviews, 442 were found and interviewed, a response rate of 80%. A comparison of telephone interview respondents with in-person interview respondents showed that the telephone sample underrepresented lower-income households. The sample was reweighted to adjust for that bias, as described in the next section.

Of the 10,369 sampled students for whom addresses or telephone numbers were provided by schools or districts, some portion of the needed data was collected for 84%; the response rates for individual components of the study were as follows:

	N	Response Rate
Parent interview	7619	71%
School records	6241	60
School survey	6672	64

Weighting Procedures and the Population to Which Data Generalize

Youth with disabilities for whom data could be gathered were weighted to represent the U.S. population of special education students in the 1985-86 school year who were in grades 7 through 12 or at least 13 years old. Because it is a sample of students at various ages, the NLTS sample does not generalize to youth who had dropped out of school before that age. For example, the sample of 18-year-olds generalizes to youth who were 18 and still in secondary school in 1985-86, not to all 18-year-olds with disabilities, many of whom may had left school at an earlier age.

In performing sample weighting, three mutually exclusive groups of sample members were distinguished:

(A) Youth whose parents responded to the telephone interview.

(B) Youth whose parents did not respond to the telephone interview but were interviewed in person.

(C) Youth whose parents did not respond to either the telephone or in-person interview but for whom the we obtained a record abstract.

A major concern in weighting was to determine whether there was a nonresponse bias and to calculate the weights in such a way as to minimize that bias. There was a potential for three types of nonresponse bias:*

(1) Bias attributable to the inability to locate respondents because they had moved or had nonworking telephone numbers.

(2) Bias attributable to refusal to complete an interview (only 3% of those available to be interviewed refused).

(3) Bias attributable to circumstances that made it infeasible to locate or process a student's record.

Of these three types of nonresponse, the first was believed to be the most important, in terms of both frequency and influence on the analysis. Type 1 bias was also the only type of nonresponse that could be estimated and corrected.

The magnitude of type 1 nonresponse bias was estimated by comparing responses to items available for the three groups of respondents (after adjusting for differences in the frequency with which youth in different disability categories were selected and differences in the size of the LEAs selected). Group A was wealthier, more highly educated, and less likely to be minority than group B. In addition, group A was more likely to have students who graduated from high school than group B or C (which had similar dropout rates). Groups A and B were compared on several additional measures for which data were unavailable for group C. The youth described by the two groups were similar on these additional items, including gender, employment status, pay, functional skills, association with a social group, and length of time since leaving school. Adjusting the weights to eliminate bias in the income distribution eliminated bias in parental educational attainment and ethnic composition, but did not affect differences in dropout rates. It was also determined that groups B and C were large enough that if they were treated the same as group A in the weighting process, the resulting dropout distribution would be approximately correct.

---

* We assumed that nonrespondents who could not be located because LEAs did not provide student names would have chosen to participate at about the same rate as parents in districts in which youth could be identified. The remaining nonrespondents would presumably have been distributed between the three types of nonresponse mentioned above.

Weighting was accomplished using the following steps:

- Data from the first groups of sample members were used to estimate the income distribution for each disability category that would have been obtained in the absence of type 1 nonresponse bias.

- Respondents from all three groups were combined and weighted up to the universe by disability category. Weights were computed within strata used to select the sample (i.e., LEA size and wealth, student disability category and age).

- Weights from three low-incidence disability categories (deaf, orthopedically impaired, and visually impaired) were adjusted to increase the effective sample size. These adjustments consisted primarily of slightly increasing the weights of students in larger LEAs and decreasing the weights of students in smaller LEAs. Responses before and after these weighting adjustments were nearly identical. In addition, because there were only three deaf/blind youth from medium-size or smaller districts, who had large weights, they were removed from the sample to increase the effective sample size. Thus, NLTS results do not represent the very small number of deaf/blind students in medium-size or smaller LEAs.

- The resulting weights were adjusted so that each disability category exhibited the appropriate income distribution estimated in step 1 above. These adjustments were of modest magnitude (relative to the range of weights within handicapping condition); the weights of the poorest respondents were multiplied by a factor of approximately 1.6 and the weights of the wealthiest respondents were multiplied by a factor of approximately .7.

Estimation of Standard Errors

The statistical tables present data for various subgroups of youth with disabilities. Most of the variables presented in the tables are reported as percentages of youth In some cases, rather than percentages, the figures refer to means, such as the mean age of youth contacting VR. Percentages and means are weighted to represent the national population of youth with disabilities and youth in each disability category. However, the percentages and means are only estimates of the actual percentages and means that would be obtained if all youth with disabilities were included in the study. These estimates vary in how closely they approximate the true measures that would be derived from a study of all youth. To aid the reader in determining the precision of the estimates, for each percentage and mean the tables present the approximate standard error and the unweighted number of cases on which the statistic is based.

The standard errors for the NLTS were computed using procedures that differ from standard calculation routines. Such routines assume a simple random sample. However, the NLTS used a stratified cluster sample design, which introduces design effects that reduce the precision of estimates for a

sample of a given size, compared with a simple random sample. The design effects within the NLTS affect the precision of estimates to varying degrees for different subpopulations and different variables. Pseudo-replication is widely accepted as a variance estimation technique in the presence of design effects. However, it is not cost-effective for estimating the standard errors of the thousands of variables and subpopulations tabulated in the 10 volumes of the statistical almanacs. Therefore, pseudo-replication was conducted on a limited number of variables to calibrate an approximation formula that is cost-effective for purposes of the almanacs, using the following procedures:

- A set of 25 variables representing the parent interview, school program survey, and record abstract was identified for the purpose of developing a statistical approximation formula; these included 16 nominal variables and 9 continuous variables.

- Standard errors of the weighted means of the selected variables were estimated in two ways. The first procedure involved pseudo-replication. For each variable, standard errors were calculated for students in each handicap category and for the total sample (300 standard errors) using a partially balanced experimental design specifying how students were to be allocated to 16 half-samples. The sample was split on the basis of the school districts and special schools from which youth were originally sampled. Districts and schools were paired on the basis of enrollment and a measure of poverty, and one member of each pair was assigned to each half-sample. Sample weights for students were computed for each half-sample as if those in the half-sample were the only study participants.

  The following formula was used to estimate the standard error of the mean for students in all conditions:

$$\text{Standard error} = [(1/16) \sum_i (M_i - M)^2]^{1/2}$$

  where M_i is the mean calculated for students in one of the 16 half-samples), M is the mean response calculated from the full sample, and the summation extends over all 16 half-samples. (Note that responses to questions from the school program survey were attached to the records of students in the responding schools so that means for these items were computed using student weights.)

- The second estimation procedure involved an approximation formula based on an estimate of the effective sample size for each handicap category and the total sample. The sampling efficiency (E) for a group was calculated using the following formula:

$$E = M_w^2/(M_w^2+S_w^2)$$

  where M_w and S_w are the mean and standard deviation of the student weights over all members of the group. The approximation formula for the standard error of the weighted mean of nominal variables is:

$$\text{Standard error} = [P(1-P)/(E \times N)]^{1/2}$$

where P is the full-sample weighted proportion of "yes" responses to a particular question in the group, N is the unweighted number of "yes" or "no" responses to the question in the group, and E is the sampling efficiency of the group. The approximation formula for the standard error of the mean of a continuous variable is:

$$\text{Standard error} = [S^2/(N \times E)]^{1/2}$$

where S^2 is the variance of responses in the group for the continuous variable (computed with frequencies equal to full-sample weights) and N is the unweighted number of respondents to the question in the group. These formulas were used to compute a total of 300 standard errors for the same variables and groups addressed using pseudo-replication.

- To assess the accuracy of the standard errors produced by these formulas, we used scatter plots to compare them with standard errors produced using pseudo-replication. For both nominal and continuous variables, the approximate best fit was a 45 degree line. That is, on average, the formula based on estimates of effective sample size neither systematically overestimated nor underestimated the standard error obtained using pseudo-replication, arguing for use of the more cost-effective estimation formulas. However, because error remains in the estimates that might result in underestimating the true standard errors in some instances, we took a conservative approach and multiplied the standard errors produced using the estimation formulas by 1.25. The vast majority of the standard errors so obtained were larger than the standard errors obtained by pseudo-replication. Thus, the standard errors included in the almanacs were calculated using the effective sample size estimation formulas and increased by a factor of 1.25.

Caveats to Users of the Data

To minimize the potential that data in this report will be misinterpreted, the reader should keep in mind the following considerations.

- *Estimation of Sampling Errors.* The data tables contain approximate standard errors for means and percentages. Users should interpret data in light of the standard errors. Percentages or means based on subgroups with relatively few cases have a considerably greater margin of error than those based on larger subgroups.

- *Subgroup Definitions.* Results are often calculated for subgroups of youth; readers should be clear about the subgroup to which data refer to avoid misinterpreting findings. Of particular note are the subgroups based on the youth's designated disability. Assignment to a disability category is based on the primary disability designated

by the youth's school or district in the 1985-86 school year. Category definitions, assessment methods, and rules of thumb for categorizing students vary widely between states and often between school districts within states. NLTS data should not be interpreted as describing youth who truly had a particular disability, but rather as describing youth who were categorized as having that disability by their school or district.

- *Sources of Data and Data Reliability.* Each table indicates the source of the data reported in it (e.g., parent interview). The confidence the reader places in the data should be based in part on a recognition of their source. The accuracy of parent reports about their adolescent or adult children may vary depending on the subject of an item. For example, parents were expected to be quite accurate reporters of data on family characteristics, but to be less aware of--and, therefore, report less accurately on--the kinds of services their children were provided in school or by other agencies. When two sources of data were available for a given item (e.g., parent reports and school record indications of whether the youth graduated or dropped out), consistency checks were performed. For many variables, a high level of agreement was found, while for other items, larger discrepancies were noted. Such discrepancies were resolved using decision rules reported elsewhere (see Wagner and Javitz, 1990). However, for most items, only one source of data was available, making it impossible to verify the accuracy of the responses.

- *Missing Data.* Missing data result from item nonresponse, the absence of the whole instrument from which an item was taken, or a logical skip of an item because it was inappropriate to a particular respondent (e.g., some items were asked only of parents of youth with particular kinds of disabilities). Missing data of all kinds were eliminated from calculations of percentages and means. Hence, the reported percentages and means are based on those for whom the question was appropriate and who answered the question. The approximate standard errors increase as the sample size decreases, drawing the user's attention to statistics that are based on particularly small samples.

REFERENCES

Javitz, H. and Wagner, M. (1990). National Longitudinal Transition Study of Special Education Students: Report on Sample Design and Limitations, Wave 1 (1987). Menlo Park, CA: SRI International.

Moore, M., et al. (1988). Patterns in Special Education Service Delivery and Cost. Washington, DC: Decision Resources Corp.

Wagner, M. and Javitz, H. (1990). National Longitudinal Transition Study of Special Education Students: Measurement and Analysis Issues. Menlo Park, CA: SRI International.

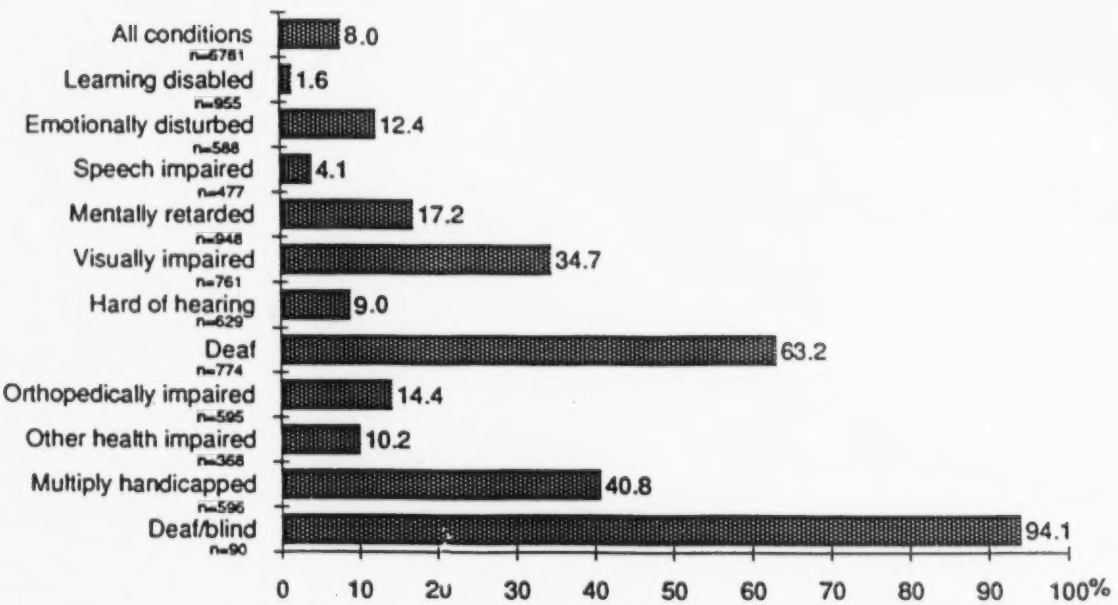

Figure B-1 PERCENTAGE OF YOUTH WITH DISABILITIES WHO ATTENDED SPECIAL SCHOOLS

Source: Survey of Secondary Education Programs and/or students' school records from their most recent school year.

Table B-1
MULTIVARIATE ANALYSIS COEFFICIENTS FOR ANALYSES OF SCHOOL PERFORMANCE

	Coefficients for:		
	Absenteeism Analysis	Course Failure Analysis	Dropout Analysis
Other Aspects of School Performance			
Student absenteeism	N/A	.05***	.04***
Student failed one or more courses	N/A	N/A	1.22***
Disability Characteristics			
Youth classified as the following (rather than learning disabled):			
Emotionally disturbed	-1.54	.28	.31
Speech impaired	-4.88***	.02	-.20
Mildly/moderately mentally retarded	-1.40	-.34	-.38
Deaf	-5.43***	-.83***	-.45
Hard of hearing	-4.59***	-.42	-1.41
Visually impaired	-3.29**	-.72**	.01
Orthopedically impaired	-1.98	-.61*	-1.08
Other health impaired	1.37	-.80**	-.65
Severely impaired (SMR, multiply handicapped)	-2.84*	-1.07**	-1.83*
Functional ability scale score	.28*	.03	-.06
Self-care ability scale score	-.83***	.06	.05
IQ score	.04	-.01	.00
Individual Characteristics			
Age in most recent school year	.18	-.11**	.13
Youth was male	-.66	.47***	-.43
Youth was minority	.46	.33*	-.74*
Household Characteristics			
Household income (5 category scale)	-.66***	-.08*	-.02
Student was from single-parent household	2.16***	-.06	.26
Community Characteristics			
Urban residence	2.13**	.10	-.10
Rural residence	-1.29	.07	.47
Student Behaviors			
Has had disciplinary problems	8.71***	.45*	1.77***
Student belonged to school/community group in previous year	-2.58***	-.36**	-1.00**
Frequency of seeing friends (6 category scale)	.60**	.12**	-.08
Prior academic achievement (older than typical age-for-grade	.52	.24	.69
Student had a job in previous year	-.29	-.19	-.03

*=p<.05; **=p<.01; ***=p<.001

Table B-1 (Concluded)
MULTIVARIATE ANALYSIS COEFFICIENTS FOR ANALYSES OF SCHOOL PERFORMANCE

	Coefficients for:		
	Absenteeism Analysis	Course Failure Analysis	Dropout Analysis
School Characteristics			
Attended special school	-.56	-.05	.27
Student enrollment	-.00	.00*	-.00
School Policiies			
Mainstreamed students expected to keep up in regular ed. classes without help	.85	.13	.17
School provided to regular education teachers with mainstreamed students:			
Special materials for students	.10	-.07	-.23
Inservice training	-.32	.27*	.20
Classroom aides	.31	.04	-.00
Smaller classes	-.11	-.01	.46
Students' School Programs			
Student took occupationally-oriented vocational education	-1.48*	-.17	-.60*
Student took nonacademic courses	-.28	-.02	-.31
Percent time in regular education classes	-.01	.01***	.00
Student received tutoring help	-.62	-.01	-1.00*
Student received counseling/therapy	2.19***	.13	-1.04**
Number of courses in which grades given	NA	.255***	NA

*=p<.05; **=p<.01; ***=p<.001

Table B-2
COMPARISON OF UNWEIGHTED MEANS FOR STUDENTS IN THE TOTAL SAMPLE AND THOSE IN MULTIVARIATE ANALYSES OF SCHOOL PERFORMANCE

Analytic Variables	Mean Values for Students in: Full Sample	Absenteeism Analysis	Course Failure Analysis	Dropout Analysis
Dependent measures				
Average days absent	12.8	12.5	12.4	12.4
Received failing grade	21.8	N/A	23.4	22.7
Student dropped out	8.1	N/A	N/A	4.1
Disability Characteristics				
Disability category				
Emotionally disturbed	8.7	8.7	8.7	8.7
Speech impaired	5.4	4.6	4.9	5.2
Mildly/moderately mentally retarded	13.4	10.5	10.2	10.5
Deaf	11.8	17.4	17.0	16.8
Hard of hearing	8.0	7.9	8.1	8.0
Visually impaired	10.1	11.8	11.7	11.2
Orthopedically impaired	7.6	7.9	8.1	7.9
Other health impaired	6.7	5.5	5.6	5.5
Severely impaired (e.g., multiply handicapped, SMR)	14.0	5.7	6.5	5.9
Functional ability scale score	12.9	13.4	13.7	13.8
Self-care ability scale score	11.0	11.4	11.3	11.4
IQ	81.7	87.4	87.2	87.6
Individual Characteristics				
Age in most recent school year	17.6	17.4	17.4	17.5
Youth was male	60.8	60.1	60.4	60.9
Youth was minority	35.6	32.2	32.2	31.4
Household Characteristics				
Annual income scale score	3.0	3.0	3.1	3.1
Single parent household	33.7	32.0	31.9	32.3
Community Characteristics				
Attended school in:				
Urban area	41.5	38.6	39.6	38.6
Rural area	23.1	25.1	23.9	24.0
Student Behaviors				
Had disciplinary problems	9.3	8.4	8.4	9.1
Belonged to school/community group	43.8	48.0	48.2	43.0
Frequency saw friends (5-item scale)	3.0	3.2	3.2	3.2
Had a job in the past year	56.4	61.8	61.7	63.7
Previous academic achievement (older than age-for-grade)	77.0	75.7	75.3	75.3

Table B-2
COMPARISON OF UNWEIGHTED MEANS FOR STUDENTS IN THE TOTAL SAMPLE AND THOSE IN MULTIVARIATE ANALYSES OF SCHOOL PERFORMANCE

Analytic Variables	Mean Values for Students in: Full Sample	Absenteeism Analysis	Course Failure Analysis	Dropout Analysis
School Characteristics				
Attended special school	26.4	22.9	21.7	20.5
School enrollment	943.6	991.8	1,042.6	1,040.0
School Policies				
Mainstreamed students expected to keep up without help	23.5	25.6	27.3	28.0
Teachers with mainstreamed students routinely provided:				
Special materials	40.3	24.2	46.6	47.2
Inservice training	32.4	35.9	37.0	37.5
Classroom aides	26.7	30.9	32.5	32.7
Smaller class size	8.7	9.9	10.0	10.4
Students' School Programs				
Student took:				
Occupationally-oriented vocational education	46.2	63.6	63.1	63.7
Nonacademic classes	86.5	86.3	86.2	85.0
Student received from the school in past year:				
Help from a tutor/reader/interpreter	22.7	29.5	29.2	26.1
Counseling/therapy	21.2	24.3	23.8	21.2
Percent time in regular ed.	43.1	50.6	60.0	51.8
Number of courses for which grades received	5.3	N/A	6.4	N/A
N	4,709-7,757	2,964	2,744	2,668

* There are few significant differences between means for the full sample and those for the subsamples used for the multivariate analyses. However, because the school performance models include the student being older than the typical age-for-grade, only students assigned to a grade level are included, resulting in the lower percentage of youth with severe impairments and a higher percentage of youth taking occupationally oriented vocational education, for example. Correlations (Table B-3) reveal few differences; even so, conservatively, analyses should be considered as generalizing to students assigned to grade levels.

Table B-3

COMPARISON OF CORRELATIONS BETWEEN INDEPENDENT VARIABLES AND MEASURES OF SCHOOL PERFORMANCE FOR STUDENTS IN THE TOTAL SAMPLE AND THOSE IN THE MULTIVARIATE ANALYSES

Analytic Variables	Correlations with Absenteeism for: Full* Sample	Absenteeism Model	Correlations with Course Failure for: Full* Sample	Failure Model	Correlations with Dropping Out for: Full* Sample	Dropout Model
School Performance						
Average days absent	1.00	1.00	.27***	.29***	.20***	.18***
Received failing grade	N/A	N/A	1.00	1.00	.18***	.22***
Was not promoted	N/A	N/A	N/A	N/A	1.00	1.00
Disability Characteristics						
Disability category						
Emotionally disturbed	.08***	.07***	.14***	.13***	.13***	.13***
Speech impaired	-.05***	-.06**	.08***	.06**	.00	.01
Mildly/moderately mentally retarded	.02	.01	-.01	-.02	.04**	.02
Deaf	-.10***	-.10***	-.10***	-.13***	-.06***	-.07***
Hard of hearing	-.04**	-.05*	-.00	.01	-.03**	-.05**
Visually impaired	-.06***	-.05*	-.03	-.06**	-.03**	-.03
Orthopedically impaired	.02	.02	-.04**	-.03	-.04**	-.03
Other health impaired	.04*	.06**	-.01	-.02	-.01	-.02
Severely impaired (e.g., multiply handicapped, SMR)	-.00	-.00	-.16***	-.09***	-.04**	-.03
Functional ability scale score	.01	.03	.20***	.13***	.02	.02
Self-care ability scale score	-.05**	-.05**	.17***	.11***	.03*	.03
IQ	-.02	-.03	.12***	.03	.01	-.01
Individual Characteristics						
Age in most recent school year	.02	.02	-.11***	-.09***	.07***	.05**
Youth was male	.00	.02	.08***	.10***	.03*	.03
Youth was minority	.08***	.10***	.08***	.08***	.00	-.01
Household Characteristics						
Household income scale score	-.14***	-.16***	-.07***	-.09***	-.09***	-.05**
Single parent household	.12***	.15***	.05**	.06**	.05***	.03
Community Characteristics						
Urban residence	.12***	.13***	.04**	.07***	.01	-.00
Rural residence	-.07***	-.08***	-.01	-.03	.03*	.02
Student Behaviors						
Belonged to school/community group in the past year	-.16***	-.16***	-.09***	-.12***	-.16***	-.13***
Had disciplinary problems	.18***	.22***	.16***	.14***	.26***	.25***
Frequency of seeing friends	.04*	.06**	.17***	.12***	.03*	.03
Previous academic achievement (older than age-for-grade)	.06***	.00	.02	.01	.07***	.05**
Had a job in past year	-.04*	-.03	.00	-.03	-.08***	-.02

*=p<.05; **=p<.01; ***=p<.001

Table B-3 (Concluded)
COMPARISON OF CORRELATIONS BETWEEN INDEPENDENT VARIABLES AND MEASURES OF SCHOOL PERFORMANCE FOR STUDENTS IN THE TOTAL SAMPLE AND THOSE IN THE MULTIVARIATE ANALYSES

Analytic Variables	Correlations with Absenteeism for: Full* Sample	Absenteeism Model	Correlations with Course Failure for: Full* Sample	Failure Model	Correlations with Dropping out for: Full* Sample	Dropout Model
School Characteristics						
Attended special school	-.05***	-.04	-.21***	-.16***	-.04***	-.03
School enrollment	.03**	.01	.14***	.10***	.00	-.03
School Policies						
Mainstreamed students expected to keep up without help	.04**	.04	.12***	.08***	-.00	.01
Teachers with mainstreamed students routinely provided:						
Special materials	.03	.01	.09***	.06**	-.00	.00
Inservice training	-.01	-.01	.12***	.09***	-.00	.03
Classroom aides	-.01	-.02	.04**	.03	-.02	-.02
Smaller class size	-.02	-.03	.02	.00	.02	.02
Students' School Programs						
Student took:						
Occupationally-oriented vocational education	-.02	-.06**	.03	-.02	-.08***	-.05**
Nonacademic classes	.01	-.02	.05**	.06**	-.03*	-.00
Student received:						
Help from tutor/reader/ interpreter	-.06***	-.06**	-.08***	-.07**	-.09***	-.09***
Counseling/therapy	.06***	.08***	-.01	.00	-.05***	-.04*
Percent time in regular ed.	-.02	-.04	.24***	.29***	-.01	.01
Number of courses for which grades received	N/A	N/A	.24***	.13***	N/A	N/A
N	4,161-7,757	2,194	4,161-6,573	2,401	2,813-4,872	2,668

Note: Significance levels for correlations involving the full sample are expected to be higher generally than significance levels for the models because of the larger sample size involved with the full sample of students. Readers should focus on the magnitude of the coefficients, not merely significance levels.

*=p<.05; **=p<.01; ***=p<.001

Table B-4
LOGIT COEFFICIENTS FOR FACTORS RELATED TO POSTSECONDARY OUTCOMES

Characteristics	Logit Coefficients for Analyses of: Enrollment in Vocational School	Currently Employed For Pay
Disability Characteristics		
Disability category		
Emotionally disturbed	-.62	-.44
Speech impaired	-.70	-.07
Mildly/moderately mentally retarded	-.70	-.60
Visually impaired	-1.20	-1.17***
Hard of hearing	-.74	-.41
Deaf	-.43	-1.17***
Orthopedically impaired	-1.42	-2.57***
Other health impaired	-.70	-.68*
Severely impaired (e.g., multiply handicapped, deaf/blind)	-1.63	-.33
Functional mental skills	.08	.11**
Self-care skills	-.01	.45***
IQ	-.00	.01
Demographic Characteristics		
Youth's age	-.11	-.17*
Youth was male	.41	.55***
Youth was minority	.43	-.16
Head of household's education	.05	.12
Youth was from single-parent household	-.16	.25
Youth lived in:		
Urban area	-.25	-.42*
Rural area	.17	-.23
Unemployment rate in local area	N/A	-.05*
Other Activities/Behaviors		
Youth was high school graduate	.50	.74***
Youth aged out of high school	.53	-.30
Youth out of high school 1 to 2 years	-.74**	.21
Belonged to school/community group	N/A	.18
Frequency of seeing friends (6 category scale)	N/A	.07
School Factors		
Youth took in last school year:		
Occupationally oriented vocational education	1.01**	N/A
Any vocational education	N/A	.40*
Voc. ed. with work experience	N/A	.57**
Percentage of time spent in regular education in last year in high school	-.00	.00
Youth attended special secondary school	.61	-.22

Table B-5
UNWEIGHTED MEANS FOR FACTORS RELATED TO POSTSECONDARY OUTCOMES FOR THE FULL SAMPLE OF YOUTH AND THOSE IN MULTIVARIATE ANALYSES

Characteristics	Postsecondary School Analysis: Full* Sample	Postsecondary School Analysis: Analysis Sample	Employment Analysis: Full** Sample	Employment Analysis: Analysis Sample
Enrollment in postsecondary vocational/trade school	9.1	9.0	N/A	N/A
Currently employed for pay	38.2	N/A	38.2	39.0
Disability Characteristics				
Disability category				
Emotionally disturbed	11.5	10.8	10.7	9.1
Speech impaired	7.4	7.1	6.3	5.6
Mildly/moderately mentally retarded	14.1	15.3	13.3	14.6
Visually impaired	7.6	7.2	9.2	9.1
Hard of hearing	8.0	7.8	6.8	6.1
Deaf	9.7	9.0	13.5	16.0
Orthopedically impaired	7.2	6.1	6.5	5.4
Other health impaired	7.0	5.8	6.3	5.3
Severely impaired (e.g., multiply handicapped, deaf/blind)	7.4	6.5	10.5	10.9
Functional mental skills	13.8	14.0	13.4	13.5
Self-care skills	11.3	11.4	11.1	11.2
IQ	86.9	85.5	85.1	83.4
Demographic Characteristics				
Youth's age	19.8	19.6	19.9	19.8
Youth was male	62.4	62.0	61.5	61.0
Youth was minority	33.2	27.5	33.5	29.2
Head of household's education (5 category scale)	2.1	2.1	2.2	2.2
Youth was from single-parent household	33.1	31.7	33.8	32.9
Youth lived in:				
Urban area	40.7	34.5	40.6	35.0
Rural area	22.5	26.1	23.4	27.2
Other Activities/Behaviors				
Youth belonged to school/community group	31.8	N/A	31.8	35.6
Frequency of seeing friends (6 category scale)	3.2	N/A	3.2	3.2
Youth was high school graduate	63.4	80.1	61.8	76.6
Youth aged out of high school	17.8	4.4	18.1	7.3
Youth out of high school 1 to 2 years	51.0	41.7	49.9	41.8

Table B-6
CORRELATIONS WITH POSTSECONDARY OUTCOMES
FOR THE FULL SAMPLE OF YOUTH AND THOSE IN MULTIVARIATE ANALYSES

Characteristics	Unweighted Correlations with: Enrollment in Vocational/ Trade School — Full Sample	Enrollment in Vocational/ Trade School — Analysis Sample	Youth Currently Had a Paid Job — Full Sample	Youth Currently Had a Paid Job — Analysis Sample
Disability Characteristics				
Disability category				
Emotionally disturbed	.02	-.00	.08***	.06*
Speech impaired	.02	-.02	.09***	.14***
Mildly/moderately mentally retarded	-.04	-.01	-.06**	-.09**
Visually impaired	-.03	-.05*	-.08***	-.08**
Hard of hearing	.02	-.01	.06**	.08**
Deaf	.02	.02	-.05**	-.07**
Orthopedically impaired	.02	-.05	-.14***	-.16***
Other health impaired	.03	-.03	-.05**	-.04
Severely impaired (e.g., multiply handicapped, deaf/blind)	-.06*	-.05	-.17***	-.16***
Functional mental skills	.07**	.07*	.33***	.32***
Self-care skills	.08***	.06	.30***	.31***
Demographic Characteristics				
Youth's age	-.03	-.04	-.15***	-.20***
Youth was male	.03	.06	.18***	.14***
Youth was minority	.05*	.01	-.13***	-.14***
Head of household's education	-.01	-.00	.09***	.09***
Youth was from single-parent household	.01	-.02	-.02	-.02
Youth lived in:				
Urban area	-.01	-.00	-.14***	-.10***
Rural area	-.11***	.05	.02	-.03*
Unemployment rate	N/A	N/A	-.06**	-.08**
Youth Behaviors				
Frequency of seeing friends	N/A	N/A	.20***	.19***
Group membership	N/A	N/A	.04*	.09**
School Factors				
Youth was high school graduate	.10***	.05	.15***	.17***
Youth aged out of high school	-.01	-.03	-.15***	-.19***
Youth out of high school 1 to 2 years	-.07**	-.10**	.03	.01
In last year in high school youth took:				
Occupationally oriented vocational education	.12***	.13***	N/A	N/A
Any vocational education	N/A	N/A	.12***	.13***
Vocational education with work experience	N/A	N/A	.10***	.10***
% of time spent in regular education in last year in secondary school	-.01	.02	.31***	.29***
Youth attended special school	-.00	.01	-.25***	-.23***

*=p<.05; **=p<.01; ***=p<.001

Table B-6 (Concluded)
UNWEIGHTED MEANS FOR FACTORS RELATED TO POSTSECONDARY OUTCOMES
FOR THE FULL SAMPLE OF YOUTH AND THOSE IN MULTIVARIATE ANALYSES

Characteristics	Postsecondary School Analysis		Employment Analysis	
	Full* Sample	Analysis Sample	Full** Sample	Analysis Sample
ESchool Factors				
Youth in last year in high school:				
Occupationally oriented voc ed	44.5	64.6	N/A	N/A
Any vocational education	N/A	N/A	55.8	77.3
Voc ed with work experience	N/A	N/A	8.6	11.8
Percentage of time spent in regular education	57.1	57.8	45.3	46.0
Youth attended special secondary school	9.8	5.2	26.1	26.2

* Includes youth ages 16 to 23, noninstitutionalized, and out of secondary school.
** Includes youth age 16 or more, noninstitutionalized, and out of secondary school. Compared to the postsecondary education analysis, the inclusion of older youth in this analysis increases the percentage of youth attending special schools and who were more severely impaired, who had stayed in secondary school until older ages.

Appendix C
INDEPENDENT VARIABLE DEFINITIONS AND HYPOTHESES SUPPORTING THEIR INCLUSION IN ANALYSES

This appendix describes the sources, construction, and hypotheses of the factors included in multivariate analyses, along with measures of vocational education enrollment described in the text.

Individual/Household/Community Characteristics (Box A)

Disability-Related Characteristics. Because vocational education is more common for students in some disability categories, particularly those with generally higher functional abilities, the influences of these factors on transition outcomes must be controlled for if the independent relationship to vocational education is to emerge. The following factors were included in analyses:

- *Disability category*. Information on the nature of youths' disabilities were gathered from three sources. The original designation of youths' primary disabilities that was the basis for their being sampled for the NLTS came from rosters of secondary special education students submitted by districts included in the study. In addition, parents were asked in telephone interviews: "For what learning problems or other disabilities has (NAME) gotten special services? Which of these has been (NAME'S) main learning problem or disability?" Finally, data collectors who abstracted information from students' school records were asked to record all disabilities for each student that were designated in the school record or IEP.

  For all crosstabulations throughout this report, youth are assigned to a a disability category based on the primary disability designated by the youth's school or district in the 1985-86 school year. Descriptive data are nationally generalizable to youth who were classified as having a particular disability in the 1985-86 school year.

  In multivariate analyses, somewhat different groupings were used because our purpose was different. Rather than present findings for youth in a particular category, the purpose of using variables designating disability categories in multivariate analyses was to identify the independent effects of having a particular kind of disability. For this purpose, it was important to eliminate some of the measurement variability within the categories; e.g., some youth with IQs that exceeded their state's limit for designation as mentally retarded were still classified as mentally retarded, whereas other youth with the same IQ from a different district in the same state were classified as learning disabled . This kind of variability reduces the power of the variables to distinguish significant differences in outcomes. Hence, we sought to establish somewhat more homogenous groupings of youth, in essence imposing a more standard definition of a disability on the variability that exists naturally.

We also sought to resolve several apparent discrepancies between our three sources of data regarding the nature of youths' disability or disabilities. For example, some reports of youths' disabilities that were taken from their individual school records in 1986-87 differed from the disability classification reported for them by their school district in 1985-86, indicating a change in their classification.

Further, having three sources of data extended our picture of the disabilities of some youth. For example, in the case of school districts that used a single category of "hearing impaired" rather than two categories distinguishing deaf and hard of hearing, additional data helped us to recategorize youth who were deaf into that category. Overall, 14% of youth were recategorized for multivariate analysis purposes only.

We also sought to reduce the number of disability categories to establish greater parsimony in the multivariate analyses. In particular, the category of deaf/blind was so small that it could not function usefully in the analyses. Youth in that category also functioned very similarly to youth in the multiply handicapped category, to those who were severely/profoundly mentally retarded, and to youth within the other health impaired category who were designated as autistic. Thus, we created a category of "severely impaired," which contains youth with multiple handicaps, severe/profound mental retardation, autism, and those who were deaf/blind.

- *Functional mental skills*. Parents were asked: "How well does (NAME) do each of the following things on his/her own, without help? Look up telephone numbers in the phone book and use the phone; tell time on a clock with hands; read and understand common signs like STOP, MEN, WOMEN, OR DANGER; count change. (FOR EACH TASK) Would you say very well, pretty well, not very well, or not at all well?" A scale was formed by assigning a value of 4 to "very well." 3 to "pretty well," 2 to "not very well" and 1 to "not at all well." Scores were summed for the 4 tasks to create a scale ranging from 4 to 16.

  For multivariate analyses, in which maintaining a maximum sample size was a major concern, youth who were missing a single item in the scale were imputed a value on that item by predicting a value for the single missing item using the three present components of the scale, the disability category of the youth, and age (n=185).

- *Self-care skills* Parents were asked the following item in telephone interviews: "How well does (NAME) do each of the following things on his/her own, without help: dress him/herself completely, feed him/herself completely, get places outside the home, like to school, to a nearby store or park, or to a neighbor's house. Would you say he/she does it very well, pretty well, not very well, or not at all well?" Values were assigned as with the functional mental skills scale and summed for the 3 tasks to create a scale ranging from 3 to 12.

For multivariate analyses, in which maintaining a maximum sample size was a major concern, youth who were missing a single item in the scale were imputed a value on that item by predicting a value for the single missing item using the two present component of the scale, the disability category of the youth, and age (n=48).

This question was asked only of parents of youth who were classified as mentally retarded, visually impaired, deaf, orthopedically impaired, other health impaired, multiply handicapped, or deaf/blind. They were not asked of parents of youth who were classified as learning disabled, emotionally disturbed, speech impaired, or hard of hearing, with no other disabilities because such disabilities were assumed not to interfere in most cases with the performance of the basic self-care skills being investigated. Youth in these categories were assigned a value corresponding to "very well" for each item, which would sum to a score of 12 (high) on the corresponding scale. If the skills of youth in these categories actually were lower, the reported self-care skills scores would overestimate abilities.

- *Measured IQ* IQ scores were taken from students' school records for their most recent year in secondary school and recorded on the school record abstract form. IQ data were not available for all youth and the fraction of students for whom IQ scores were available varied considerably for youth in different disability categories. For example, IQ scores were present in school records for 86% of youth classified as mentally retarded, but for only 47% of youth with other health impairments. The relatively high rate of missing data for youth in some categories raised the question of whether available IQ scores were systematically biased downward.

  To address this issue, the functional ability levels were compared for youth with and without IQ scores in each disability category. To the extent that functional ability correlates with measured IQ ($r=.54$; $p<.001$), bias would be indicated if lower functional ability scores were observed for youth with IQ scores and higher functional ability scores for youth without IQ data. For youth classified as emotionally disturbed, hard of hearing, learning disabled, or visually impaired, there were no significant differences between youth with and without IQ test scores, indicating an absence of bias for those youth. However, youth classified as orthopedically impaired, other health impaired, or speech impaired with IQ data had significantly lower functional mental skills scale scores than those for whom IQ data were unavailable ($p<.05$). Thus, there appears to be a downward bias in the IQ scores for those youth. An opposite relationship of functional abilities and IQ was observed for youth in the deaf/blind, multiply handicapped, and mentally retarded categories. For them, functional abilities were significantly higher for youth with IQ scores ($p<.001$). For these categories, an upward bias in IQ scores is apparent.

  In multivariate analyses, data were imputed for some missing cases by predicting a value for IQ based on an regression equation predicting IQ as a function of the primary disability category, whether the youth was mildly, moderately, or severely mentally retarded as a secondary disability, the functional mental skills scale score, ethnic background, and household income.

Demographics--Demographic measures were included in analyses because they capture important variations in who was enrolled in vocational education and because a substantial body of literature suggests their influence on school performance (see for example Rumberger, 1987; Eckstrom et al., 1986; GAO, 1986; Pallas, Natriello, and McDill, 1988; Peng and Takai, 1987; Scott-Jones, 1984; U.S. Bureau of the Census, 1987) and on youth employment (see for example, Greenberger and Steinberg, 1983). Specific demographic variables and their sources are included in Table C-1.

Characteristics of Youths' Secondary Schools/Programs (Boxes B and C)

We also consider several aspects of schools, their policies, and the educational programs students experience there to understand their relationships to transition outcomes of youth with disabilities:

- *Took occupationally oriented vocational education.* The variable indicating whether the youth took occupationally-oriented vocational education is drawn from school records and/or parent interviews.

  The school record item involved a listing of courses the student took in the most recent school year. If a vocational course was listed the abstractor was asked to circle on an extensive list of labor market areas the type of training the student received (e.g., agricultural, distributive education, office occupations, prevocational skills). If a specific labor market area was circled, the student's vocational education was considered to be occupationally specific.

  In addition, parents were asked: "What kinds of job training or help has (NAME) had in the past 12 months? Has he/she had testing to find out his/her work interests or abilities; training in specific job skills, like care repair or food service; training in basic skills needed for work, like counting change, telling time, or using transportation to get to work; career counseling (like help in figuring out jobs (NAME) might be suited to; or help in finding a job or learning to look for one." They also were asked to indicate, for each kind of vocational assistance, who provided it; responses (not read to the parent) included the youth's secondary school.

  If parents indicated youth had received training in specific job skills in the previous year and the source was the youth's school, the youth was coded as having taken occupationally specific vocational education.

  For 16% of cases, the variable was based on the school record alone; for 21% of cases it was based on the parent interview alone. For 63% of cases, both sources were available. In the event of discrepancies, a student was coded as having taken occupationally oriented vocational education if either the school record or the parent interview met the criteria for a positive response.

Table C-1
DEMOGRAPHIC VARIABLES USED IN NLYS ANALYSES

Variable	Source	Values	Definition/Construction
Gender	Parent interview	1	Male
		0	Female
Ethnicity	Parent interview	1	Black
		2	White
		3	Hispanic
		4	American Indian/Alaskan Native
		5	Asian, Pacific Islander
Youth's age	Parent interview or school record	15-24	In analyses of youth outcomes or activities in 1987, age in 1987 is used. Analyses of experiences in the most recent school year (e.g., grades received), use age in that school year.
Head of household's highest education	Parent interview	1	Less than high school
		2	High school graduate
		3	Some college or associate degree
		4	College graduate
		5	Postgraduate education
1986 household income	Parent interview	1	Less than $12,000
		2	$12,000 to $19,999
		3	$20,000 to $24,999
		4	$25,000 to $37,999
		5	$38,000 to $50,000
		6	$50,000 or more
Youth came from single-parent household	Parent interview	1	Single-parent household
		0	Two-parent household
Community location	Quality Education Data (QED)	1	Urban
		2	Suburban
		3	Rural
			Community location reflects the community in which the youth attended secondary school.

- *Percentage of instructional time in regular education.* Recent literature has determined that characteristics of effective programs for students with poor school performance include low student/teacher ratios and individualized programs. Although the NLTS does not measure these factors directly, they often are more characteristic of special education programs than of regular education classes. Further, grading standards in regular education courses are often more stringent. We hypothesize that students with more time in special education and, therefore, a lower proportion of instructional time in regular education, would have better school performance.

  Data on class placement was taken from students school records. Data abstractors indicated for each class taken in the most recent school year the amount of time spent per week in the class, the number of semesters the class was taken, and whether it was regular or special education. The total amount of class time was calculated by multiplying the hours per week by the semesters taken and summing over all classes. A similar calculation was then made for all courses taken in regular education. The percentage is calculated by dividing the time spent in regular education classes by the total amount of class time.

- *Attended a special school.* Because our primary interest is in the vocational education experiences of students attending regular secondary schools, we have included in these analyses a dichotomous variable indicating whether the student attended a special school, to distinguish the outcomes of those students from youth who had attended regular secondary schools.

  Data were taken from the Survey of Secondary Special Education Programs (school administrators reported the schools was a comprehensive high school, a special school for students with disabilities, a magnet school, a vocational school, or another type of school.) or from students school records (indicating the primary educational placement of the student was a special school.

Because school performance is a more direct outcome of school factors than postschool outcomes, additional variables related to schools and schools programs were included in analyses of school performance:

- *School size.* Recent research on the relationship of social bonding to better attendance suggests that students in smaller schools can more readily establish social bonds that support commitment to school and to good performance in school than can students in larger schools (GAO, 1987; Grabe, 1981; Wehlage, 1983 and 1989; Pittman and Haughwout, 1987; Gump, 1978). The Survey of Secondary Special Education Programs asked school administrators to report the average daily attendance at the school (number of students typically attending).

- *Mainstreamed students were expected to keep up in regular education classes without help.* Although the NLTS does not measure directly the presence of a caring attitude on the part of school staff, a factor found to be related to better school performance (Wehlage, 1983), we have measured the extent to which schools reported that mainstreamed

students generally were expected to keep up in regular education classes without help (more than one-third of regular school students attended schools with this "sink or swim" policy.) Such a policy may proxy for the absence of a caring attitude. We expect students who attended schools with such a policy to have poorer school performance than other students. Data were taken from school administrators responses on the Survey of Secondary Special Education Programs asking: "When your school mainstreams special education students, are they usually expected to keep up with the rest of the class without special help?"

- *Whether regular education teachers with mainstreamed students were given support.* Various forms of support to regular education teachers of mainstreamed special education students (e.g., smaller class size, special materials) were intended to help them better respond to the individualized learning needs of their students. To the extent they were successful in doing so, student performance would be higher for students attending schools whose teachers routinely were provided with such support. Data were taken from the Survey of Special Education Programs, which asked administrators to report whether each form of support was made available to regular education teachers when special education students were mainstreamed into their classes.

- *Enrollment in nonacademic courses.* Other NLTS analyses suggest that course grades were higher in nonacademic classes (Wagner, 1991). We would expect to see higher performance among students who took nonacademic courses (90% of students attending regular schools took such courses), compared to those who did not. Data were taken from students' school records for their most recent school year. Nonacademic classes include art, music, physical education and electives such as drivers' education. Students were coded as 1 if they took at least 1 such course in their most recent school year.

- *Receipt of support services.* Tutoring assistance and personal counseling are two forms of support for students that may be effective in ameliorating poor school performance. The one-to-one relationship they entail may be effective in communicating to students that someone cares about their educational performance and believes that they can achieve, factors found to be effective in improving school performance for youth at risk of school failure (Wehlage, 1989).

  For each kind of service. the NLTS determined whether the service had been received in the previous year from the youth's secondary school. The two sources of data were parent interviews and school records. Parents were asked: "Has (NAME) ever had (kind of service)? Has (NAME) had any of this (kind of service) in the past 12 months? Who has given (NAME) (kind of service) in the past 12 months?" (Response categories, not read to the parent, included, among other sources, "youth's junior or senior high school", and "special secondary school for the disabled.")

The school record abstract source involved the following item: "Which of the following services did the student receive from or through the school system (this can include contracted services) during the school year indicated on the cover sheet?" An extensive list of services included personal counseling/therapy and help from a tutor/reader/interpreter.

Responses for approximately 16% of cases were based on the school record alone, 25% on the parent interview alone, and 59% on both sources. In cases having two sources for these variables, there was agreement in 46% of cases regarding receipt of counseling/therapy and 59% of cases for help from a tutor/reader/interpreter. Decision rules for resolving discrepancies are reported in Wagner et al., 1991.

- *Number of courses for which grades were received.* Mathematically, a student's chances to receive a failing grade increase when more graded courses are taken, apart from the nature or placement of such courses. We have considered this factor only in relationship to receipt of failing grades. Data were taken from students' school records for their most recent school year. For each class taken, record abstractors reported the course grade or indicated the class was ungraded. Graded courses were summed to create this variable.

Student Activities/Behaviors (Box D)

A further category of factors expected to relate to school performance and employment involves youths' activities or behaviors (see for example, Jay and Padilla, 1987; Bachman, Green, and Wirtenan, 1971; GAO, 1987; Wehlage and Rutter, 1986; Vito and Connell, 1988; Zigmond, 1987; Alpert and Dunham, 1986; Mahan and Johnson, 1983; Thornton et al., 1989). We have included the following factors:

- *School completion.* Although a transition outcome in its own right, whether youth graduated from high school also is expected to be strongly related to their success in making the transition to either postsecondary school or employment. The school completion status variable has four categories: graduated, dropped out, aged out, suspended/expelled.

  An exiter's completion status was derived from either parent interviews and/or school record abstracts. Parents were asked to indicate whether youth left school by graduating, voluntarily leaving (dropping out), being suspended or expelled, or being older than the school age limit (aging out). The school record abstract asked abstractors to report the student's status at the end of the school year. Possible responses included: graduated, exceeded the school age limit, completed the school year and promoted to the next grade level, completed the school year but not promoted to the next grade level, dropped out, permanently expelled, transferred/moved to another school, and incarcerated, institutionalized due to handicap.

For 30% of cases, school completion status was based on the parent interview alone. For 16% of cases, values were based on the school record abstract alone. For the 55% of cases in which both the parent interview and the school record abstract were available, there was agreement between the two sources on the youth's completion status for 78% of cases. The rules for resolving discrepancies for the remaining 351 cases are reported in Wagner et al., 1991).

- *How long ago youth left school.* We expect that youth who had been out of secondary school 1 to 2 years, rather than less than a year, would have had more time to have found employment or enrolled in postsecondary vocational training, and that a positive relationship to these outcomes would be found.

  Time out of school was derived from either parent interviews and/or school record abstracts. Parents who said youth were no longer in secondary school were asked whether youth had been in secondary school in the past 12 months. If so, they were considered out of school up to 1 year. If a negative response was given, youth were considered out of school up to 2 years (all had been on school rosters as students in the 1985-86 school year). School records indicated whether the student's last year in school was 1985-86 or 1986-87.

- *Group membership.* As a proxy for social bonds, whether parents reported students had belonged to a school or community group in the previous year is expected to be positively associated with school bonding and related to higher school performance. To the extent that group membership indicates a willingness to abide by rules of membership, youth who chose to affiliate with groups might also demonstrate behaviors more sought by employers, leading us to hypothesize a positive relationship to employment.

- *Frequency of seeing friends.* Recent research has suggested that students who spent a significant amount of time seeing friends outside of school may have done so at the cost of more productive activities (Newman, 1991; Jay, 1991). We would expect students who spent more time socializing to have poorer school performance and a lower likelihood of employment. Parents of students still in secondary school were asked about how many days a week the student usually got together with friends outside of school. Parents of youth who were out of school were asked about how many days a week the youth got together socially with friends or family members, other than those he/she lived with.

Several additional factors were included in analyses of school performance only (not postsecondary enrollment or employment) because they apply only to secondary school students or to school performance:

- *Having had disciplinary problems.* The NLTS has constructed a variable indicating whether parents reported youth had had one or more of the following disciplinary problems: being suspended or expelled from school in the previous year, being fired from a job in the previous year, or ever being arrested. This variable is a gross indicator of youth who exhibited behaviors suggesting they had trouble

abiding by rules needed to maintain their social roles as students, workers, or members of society generally. Hence, it is expected to relate negatively to measures of school performance. (Because being fired from a job is confounded with employment, this factor is not included in postschool analyses.)

- *Student employment.* There is some controversy regarding whether student employment enhances student skills and work-related behaviors or whether it poses a threat to school performance by competing with school for students' time and energy. The NLTS has included a variable measuring whether parents reported the student had a job in the previous year, without specifying a hypothesis regarding its relationship to school performance.

- *Being older than the typical age-for-grade.* Student age was obtained from school rosters or parents; grade level was obtained from school records for the most recent school year. The typical age was assumed to be 18 for 12th graders, and 1 year younger for each earlier grade level. Seventy-six percent of secondary students with disabilities were older than the typical age of students at their grade level, suggesting that many of them had been retained in grade previously. We except youth who were older than age-for-grade to have poorer school performance.